PIBS# 3273

STOPPING
WATER POLLUTION
AT ITS SOURCE

MISA
Municipal/Industrial Strategy for Abatement

DEVELOPMENT DOCUMENT FOR THE ORGANIC CHEMICAL MANUFACTURING (OCM) SECTOR EFFLUENT LIMITS REGULATION

Ontario

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DEVELOPMENT DOCUMENT
FOR THE
ORGANIC CHEMICAL MANUFACTURING (OCM) SECTOR
EFFLUENT LIMITS REGULATION

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DEVELOPMENT DOCUMENT
FOR THE
ORGANIC CHEMICAL MANUFACTURING (OCM) SECTOR
EFFLUENT LIMITS REGULATION

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EXECUTIVE SUMMARY

This document describes the development of the Effluent Limits Regulation for the direct discharging plants making up the Organic Chemical Manufacturing (OCM) Sector.

The Regulation was developed under the Ontario Ministry of Environment and Energy Municipal-Industrial Strategy for Abatement (MISA) Program to virtually eliminate discharges of persistent toxic contaminants to Ontario's waterways.

The Limits Regulation culminates six years of development through discussion and consultation with the public, industry, academia and branches of the federal government.

Under the Regulation, twenty-six plants making up the OCM Sector will be required to control the levels of specific contaminants in their discharges to those achievable by demonstrated Best Available Technology (BAT) through pollution prevention, in-plant control and recycle, or end-of-pipe biological or activated carbon treatment.

Because each Sector plant is unique, it has its own specific list of limited parameters and limit values based on BAT performance.

In addition, the Regulation through acute lethality testing requirements will ensure that all Sector effluents are non-acutely lethal. Additional requirements for chronic toxicity testing will provide a comprehensive database for evaluation.

The level of BAT chosen is equivalent to that in place at comparable plants in the United States. The selection of the level of BAT, identified as BAT Option 2, was made on the basis of an economic achievability assessment which considered the financial position of the Sector and the cost effectiveness of the technology as measured in terms of capital dollars per kilogram of contaminants removed.

The cost, in 1991 dollars, of installing and operating the treatment works for the Sector, under BAT Option 2, has been estimated to be $51.6M and $16.1M per year, respectively. It has been determined that these costs as well as the ongoing monitoring costs will not materially affect the financial position of the plants in the Sector.

Two BAT options, more stringent than BAT Option 2, were costed at $168.3M and $637.3M for capital facilities but were rejected for use as limit standards on the basis of economic achievability and cost effectiveness criteria.

Under the Effluent Limits Regulation, Sector discharges of contaminants are expected to be reduced by at least one million kilograms per year. The Regulation represents a significant step forward in the overall protection of human health and aquatic life in Ontario and is a major step towards the Ministry's goal of virtual elimination of persistent toxic substances.

Specific information on how the OCM Sector Effluent Limits Regulation was developed is provided in this document in six sections supported by three appendices.

The first four sections cover essential background information describing in order:

- the MISA Program
- operations at the Sector plants
- the Sector's effluent database
- the selection of Best Available Technology

Section Five deals with all of the specific steps and considerations that went into the selection of parameters for limits at each plant and the statistical methodology for calculating limit values.

Explanatory information on the Regulation itself is presented in Section Six with an unofficial copy of the regulation provided in Appendix C.

Plant specific lists in Appendix A identify parameters that were edited out from the initial found parameter list in the process of deriving the final limits list for each plant.

Current and the expected treatment performance under BAT Option 2 for each limited parameter is shown in site-specific tables in Appendix B.

PREFACE

In June 1986, the Ontario Ministry of the Environment announced its Municipal-Industrial Strategy for Abatement (MISA) program with its ultimate goal of virtual elimination of persistent toxic contaminants from all discharges into Ontario's waterways.

On the industrial side, the program has encompassed nine sectors covering direct dischargers in a two phase program developed in consultation with industry and the public.

The first phase of the program, requiring twelve months of regulatory monitoring, has been completed for all nine sectors. The second phase, putting in place effluent limit regulations based on Best Available Technology Economically Achievable for plants in each of the nine sectors is nearing completion.

The Organic Chemical Manufacturing (OCM) Sector, as one of the nine industrial sectors, completed the twelve month monitoring period in August 1991. Currently, the effluent limit development phase is at a point of release of the draft effluent limit regulation for a sixty day public comment period.

This document reports on the work which has led to the development of the limits regulation for the twenty-six plants currently comprising the OCM Sector. It is being released with the draft effluent limits regulation to assist the public in understanding how and why the regulation and the plant limits were developed.

Following the sixty day review period and the incorporation of any required changes arising from the public review, the effluent limits regulation will be promulgated by the Registrar of Regulations under the Ontario Environmental Protection Act.

This development document is divided into six main sections supported by three sets of appendices. Sections Four and Five covering the selection of Best Available Technology Economically Achievable (BATEA) and the derivation of limits, respectively form the key parts of the document. Section Six provides explanatory notes clarifying the main requirements of the limits regulation.

Appendices A and B provide detailed information on the selection of parameters for limits and the current and BAT treatment performance for each plant. Appendix C contains an unofficial copy of the OCM Sector Effluent Limits Regulation.

1.0 THE MISA INITIATIVE

Introduction

This section provides an overview of the Municipal-Industrial Strategy for Abatement (MISA) program and the key components of the process that led to the development of the regulatory limits.

1.1 THE MISA PROGRAM

General Principles

The Municipal-Industrial Strategy for Abatement (MISA) program was officially announced by the Ontario Ministry of the Environment in its White Paper of June 1986.[1] The ultimate goal of the program is the virtual elimination of toxic contaminants in municipal and industrial discharges into Ontario's waterways.

For industrial direct dischargers, the program is being implemented in two phases. The first phase requiring twelve months of regulatory monitoring of effluents for each of nine[*] industrial sectors has been completed. The second phase, involving the development and implementation of effluent limit regulations based on Best Available Technology Economically Achievable (BATEA) for the same sectors is well underway with the promulgation of two[**] sector limit regulations and the imminent promulgation of three[***] others. The Organic Chemical Manufacturing (OCM) Sector draft Clean Water Limits Regulation, described in this document, is the sixth in the series of MISA Regulations. It is being released for public comment and review.

Following its sixty-day public comment period, the draft OCM Regulation will be finalized and forwarded to the Ontario Registrar of Regulations for promulgation.

Requirements to comply with the discharge limits come into effect on the first day of the fourth year following promulgation. In the three year "phasing-in period" plants are required to monitor their discharges and to install appropriate technology to ensure compliance with the limits.

When all of the MISA Regulations are in place, the final aspect of the MISA program requires scheduled periodic reviews to examine and upgrade each sector regulation to ensure that it remains current with any relevant improvements in Best Available Technology (BAT).

Through this process of ongoing evaluation and stepwise reduction, MISA's ultimate goal of virtual elimination of persistent toxic contaminants will be achieved.

---

[*] Petroleum Refining, Pulp & Paper, Metal Mining, Metal Casting, Industrial Minerals, Organic Chemical Manufacturing, Inorganic Chemical, Iron & Steel and Electric Power Generation

[**] Petroleum Refining and Pulp & Paper

[***] Metal Mining, Industrial Minerals and Metal Casting

1.2 THE MISA PROCESS

Joint Technical Committees

The regulations under the MISA program have been and are being developed with the participation of all stakeholders including industry, government and the general public.

Input into all aspects of the regulation development process was provided through sector specific Joint Technical Committees (JTCs) made up of representatives from the industrial sector, Environment Canada, the MISA Advisory Committee and the Ministry. The function of the JTC was to provide a forum for discussion of all of the relevant issues and concerns among the stakeholders arising from the Regulation development process and, through consensus building, to arrive at an agreement acceptable to all parties. Supporting the JTCs were smaller sub-committee groups charged by the JTCs to accomplish specific tasks. The function of the MISA Advisory Committee (MAC), an independent group of technical and environmental experts, was to advise the Minister of Environment and Energy on all aspects of the MISA program including the efficacy of the draft Regulations.

Public Review

A sixty day public review period is being provided for each of the draft regulations. Accompanying the release of the draft regulations are suitable reports and development documents to provide the public with background information on how the regulations were developed.

The public may provide written comments individually, or collectively under the umbrella of public interest groups such as Greenpeace, Pollution Probe, the Canadian Environmental Law Research Foundation, etc.

The MISA process calls for all of the public written comments to be reviewed by the Ministry and, where appropriate, to be recognized by amendments to the draft regulation.

Background Documents

The Effluent Monitoring Priority Pollutants List (EMPPL)

EMPPL, developed by the Hazardous Contaminants Branch of the Ministry, represents chemicals detected or potentially present in Ontario municipal and industrial effluents which are a hazard to the receiving environment. The current list of 266 contaminants is documented in two Ministry reports -- the Effluent Monitoring Priority Pollutants List (1987)[2] and the 1988 Update[3].

Of the two hundred and sixty-six EMPPL parameters, the one hundred and forty-one which had Ministry standard analytical methods, were used as the basis for developing sector-specific lists of contaminants for regulatory monitoring. The OCM Sector List also included fourteen conventional parameters.

The Issue Resolution Process

Early in 1990, special working groups called Issue Resolution Committees (IRCs) were established to formalize the effluent limits regulation development process and to provide specific guidelines to the JTCs for drafting the limits regulations on a consistent and equitable basis. Representatives of industry, municipalities, Environment Canada, the MISA Advisory Committee and the Ministry took part in the discussions over a period of six-months. Specific criteria and detailed procedures were developed for fifteen issues.

The final IRC reports on each of the issues were summarized in a Ministry Summary Report[4,4a] released in September 1991.

The procedures and criteria outlined in the summary report were to be used for each sector in developing its limits regulation.

The six step process for developing the effluent limits regulations, as outlined in the IRC Report was used in developing the Effluent Limits Regulation for the OCM Sector. The process can be summarized as follows:

Step 1: Effluent Monitoring

Under the effluent monitoring regulation for the OCM Sector, direct dischargers were required to conduct one year of effluent monitoring for a comprehensive list of contaminants. Specified parameters from the Sector List of one hundred and fifty-five parameters were monitored on a daily, thrice weekly, weekly, monthly, quarterly and semi-annual basis for process effluent, cooling water effluent, storm water effluent, emergency overflow effluent and waste disposal site effluent.

Step 2: Candidate Parameter Selection

Statistical tests were applied to the effluent monitoring data to determine candidate parameters for effluent limits setting. A parameter was selected for effluent limits unless, at a 95% confidence level, a 0.9 proportion of the data had concentration values less than the Regulation Method Detection Limit (RMDL) for that parameter.

Step 3: QA/QC Data Assessment

Quality assurance/quality control (QA/QC) data were used to evaluate the suitability of the effluent monitoring data for use in the effluent limit setting process. Data which were considered suspect or unreliable were eliminated from further consideration.

STEP 4: Best Available Technology (BAT) Identification

Through a Consultant Study, available pollution prevention and control technologies were identified and screened on the basis of the number, kind and toxicity of the contaminants controlled or treated and the contaminant reductions achieved. Best available technologies were identified from the list of available technologies according to the criteria outlined in the Issue Resolution Committee Report on Best Available Technology (BAT).

BAT technology trains were reviewed in order to determine their predicted performance and costs if they were installed at Ontario OCM plants.

STEP 5: Economic Assessment

The costs of the various BAT options and their accompanying contaminant removal performance, provided in the Consultant's Report, were used to derive abatement cost comparisons to indicate the relationship between increasingly stringent levels of control and the costs of achieving them. The financial and economic consequences associated with imposing the different levels of control were used to determine the preferred BAT option for the OCM Sector.

STEP 6: Effluent Limits Setting

Effluent limits were developed by statistically analyzing the performance of the chosen BAT plants to derive long term average loadings and appropriate daily and monthly variability factors to produce daily limits equal to the ninety-ninth percentile (P99) and monthly average limits equal to the ninety-fifth percentile (P95) BAT plant performance values.

The Ministry Monitoring Data Reports

The database generated from the one year of regulatory effluent monitoring by sector plants in the first phase of the MISA program was to serve two purposes. For plants operating BAT facilities, the data would provide performance data suitable for limit setting calculations. Data from plants without BAT treatment would serve to identify the current level of operations and confirm the need for abatement technology. Above all the monitoring data would establish which parameters were being discharged at each plant.

The Ministry has published the results of the one year of effluent monitoring in separate reports for each of the nine sectors. The OCM Sector Twelve-Month Monitoring Data Report was released in September 1992.

Consultant Best Available Technology (BAT) and Site Visit Reports

The twelve months of regulatory monitoring for each sector was intended to provide a comprehensive database reflecting current discharges at each plant. An accompanying regulatory requirement for each plant to submit an "Initial Report" describing its processes, raw materials, products, water usage and wastewater treatment would provide background information in evaluating the status of each plant with respect to BAT.

The third requirement was to obtain performance and cost information on available technology being used elsewhere in the world to compare it with that in place in Ontario. This aspect of the MISA information gathering program was tendered to outside consultants. The consultant studies provided two reports. The first report updated operations at sector plants through site visits and discussions with plant personnel. The second report provided an inventory of Best Available Technology from a global search, which would be applicable to sector plants to provide treatment to five discreet BAT levels categorized under the following BAT options:

- Non-lethal effluent
- U.S. EPA comparable
- Best in Ontario
- Maximum overall contaminant removal
- Zero discharge of contaminants.

The BAT study was also to identify, as potential BAT, demonstrated pollution prevention and water conservation practices.

The BAT Report data was supported by plant visits to BAT sister plants outside of Ontario. These visits not only provided performance data but also information on regulatory requirement in other jurisdictions. In covering the work for the nine sectors, consultants visited BAT plants in the U.S. and Europe.

The BAT Report provided long term performance data and cost information for the recommended BAT options specific to each plant in the OCM Sector.

Finally, an economic achievability study by the Ministry examining the cost of each of the options and the economic status of the sector would identify the BAT option which was economically achievable for the sector. The subsequent effluent limits for the sector would be developed to match the performance of the chosen BAT option.

2.0 SECTOR DESCRIPTION

Introduction

The first part of this section serves as an introduction to the Organic Chemical Manufacturing Sector. It defines organic chemical manufacturing, provides a historical overview of the industry and describes general organic process chemistry including wastewater generation and treatment.

The section concludes with specific information on each of the plants making up the MISA Organic Chemical Manufacturing (OCM) Sector. Emphasis is placed on the unique features of each site and the potential impact of operations on the environment.

2.1 ORGANIC CHEMICAL MANUFACTURING

Organic chemical manufacturing refers to the manufacture of chemicals based on carbon.

Carbon, almost alone among the elements, has the ability to unite with itself indefinitely to form long chain molecules. Moreover, its covalent bonding also makes carbon the basis for the formation of an extremely large number of compounds.

The organic chemical manufacturing industry, for the purposes of this Regulation, is made up of plants with three general classes of products:

- organic chemicals
- plastics
- synthetic fibres

Principal Raw Materials

The present spectrum of some of the end-products from the organic chemical manufacturing industry is shown in Figure 2-1.

Approximately 90% of the chemical precursors used in organic chemical manufacturing are derived from crude oil and natural gas. A small portion of aromatic compounds is derived from coal.

The primary seven petrochemicals used for synthesis of organic chemicals include methane, ethylene, propylene, butane/butene, benzene, toluene, and ortho- and para- xylenes. The synthesized derivatives are in turn used as feedstocks for the synthesis of other derivatives. A typical list of organic chemicals derived from ethylene is shown in Figure 2-2.

Figure 2-1
Petrochemical Sources to End-Use Applications

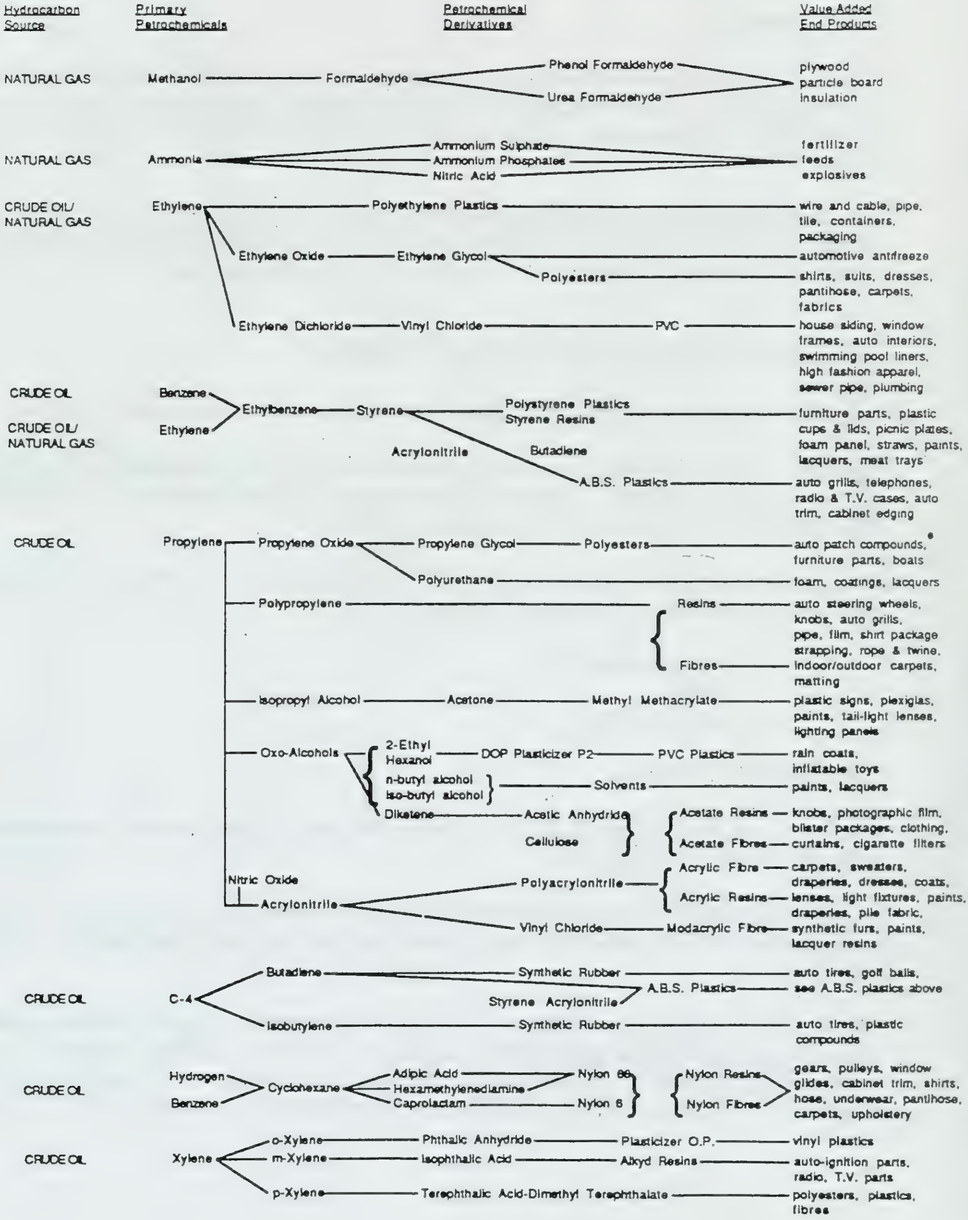
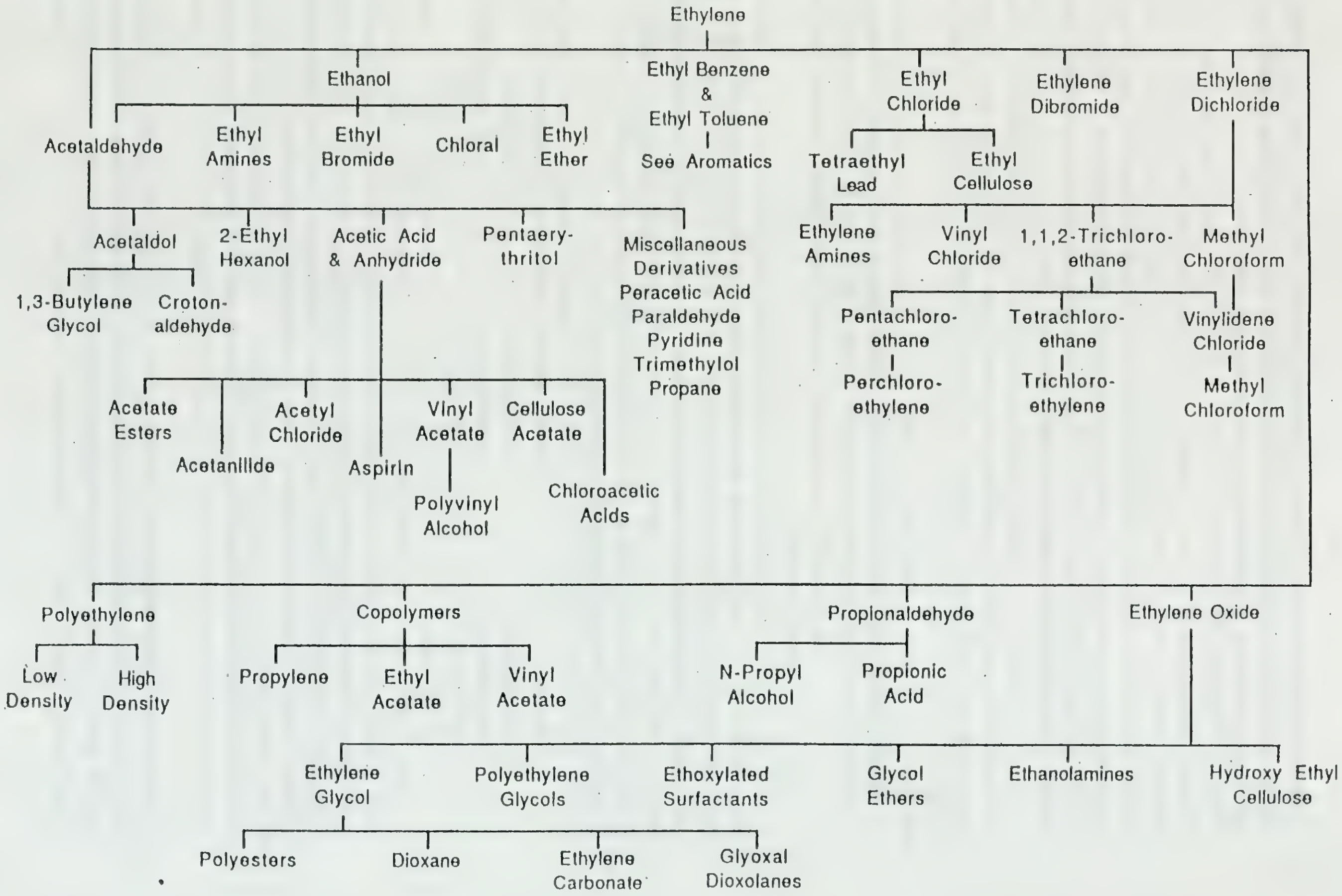


Figure 2-2
Organic Chemicals Derived from Ethylene



Due to the diverse nature of the products and processes used, few plants in the industry are alike. In general, most plants utilize several of the basic feedstocks as well as several products from other organic chemical manufacturing industries.

Process Chemistry

Chemical reactions produce a mixture of products, raw materials and by-products. The physical state of the chemical reactants (solid, liquid or gas), presence of solvents or catalysts, the temperature and pressure within the reaction vessel and the configuration of process equipment will dictate the major reaction pathway.

Raw materials and useful by-products are generally recovered from the reaction mixture to increase process efficiency. However, it is often impossible to recover all of the by-products formed.

A typical organic chemical product is manufactured through a three-step process:

- combination of reactants under suitable conditions to yield a desired product
- separation of the product from the reaction matrix, and
- final purification of the product

A number of generic unit processes are employed to produce the desired product. Both physical and chemical processes are employed, often as a series of chemical reactions/ processes. Some typical unit processes employed throughout the organic chemical manufacturing industry include the following:

- alkylation
- condensation
- dehydration
- distillation
- esterification
- extraction
- halogenation
- hydrogenation
- hydrolysis
- nitration
- oxidation
- polymerization
- pyrolysis

The organic chemical manufacturing industry is generally made up of a small number of very large plants and a large number of small, specialized plants. Large plants typically employ continuous operations due to the large volumes of chemicals produced. Batch processes are generally used for the production of small volume specialty chemicals.

Continuous processes are generally more efficient than batch processes due to a more efficient usage of process reactants and minimization of water usage.

A single site may simultaneously produce many different products using a variety of continuous and batch operations. Products being manufactured can vary on a weekly or even a daily basis. The variety of raw materials and the complexity of the processes results in an exceptionally large number of contaminants being produced.

To control the release of these contaminants, plants use a broad range of in-plant controls, process modification and optimization and end-of-pipe treatment.

Plants which are vertically integrated typically produce a number of high volume chemicals using fewer basic unit processes and are likely to produce fewer contaminants. As an example, synthetic fibres are manufactured using polymerization processes in which simple organic chemicals are reacted to form long-chain polymers.

Horizontally integrated industries, such as those which produce specialty chemicals, generally produce lower-volume products which are more complex and require a greater number of process steps and thereby produce more contaminants per kilogram of product.

Wastewater

The variation in raw materials and processes employed in the organic chemical manufacturing industry results in process wastewaters of varying composition. A wide variety and concentration of pollutants may be found in the wastewaters including both conventional and persistent toxic contaminants.

Conventional pollutants which may be present in the wastewaters of the organic chemical manufacturing industries include acids, bases, suspended solids, oil and grease, organic carbon and nitrogen. Toxic pollutants which may be present include metals, phenols and chlorinated and polyaromatic hydrocarbons. The pollutants in the wastewater may originate from raw materials, reactants, products and by-products.

The discharge of conventional and toxic pollutants can be controlled through a combination of in-plant controls and wastewater treatment. Specific controls and treatment technologies will generally depend on the products and processes used.

In-Plant Controls

In-plant controls are very cost-effective methods of limiting the discharge of pollutants through process modifications, chemical substitution and water reduction and recycling.

Process modifications include measures to improve the efficiency of the reaction thereby reducing the amount of pollutants discharged in the wastewaters. Recovery of by-products through physical treatment processes or recycling or through the control of spills from process or storage areas will also reduce losses. Additionally, changes to process equipment, such as the replacement of barometric condensers with surface condensers or the replacement of steam jet ejectors with vacuum pumps will further reduce the discharge of contaminants.

Chemical substitution involves the replacement of certain process chemicals known to be toxic and persistent with chemicals of lower toxicity or greater treatability. The replacement of one catalyst with another may increase process efficiency and reduce the toxicity of the effluent discharged.

Recycling water from building drains, scrubbers, vacuum seal discharges and surface runoff will reduce contaminant losses. Cooling water may be recycled and the process chemicals recovered and disposed of through other means. The reduction of water usage is also desirable as a cost consideration.

Wastewater Treatment

Both biological and physical-chemical processes may be used to control the pollutants discharged in wastewater.

Biological treatment involves contacting the wastewater with microorganisms which metabolize the wastes for energy and synthesis of new cells. Both aerobic and anaerobic systems are used for biological treatment. Under aerobic conditions, carbon containing wastes are converted to carbon dioxide and water while under anaerobic conditions, methane and carbon dioxide are produced. Using both aerobic/anaerobic reactions in series, nitrogen containing wastes can be converted to nitrogen gas through nitrification/denitrification reactions.

Metals and some hydrocarbons are removed in biological processes by adsorption onto the biological flocs which in turn are removed from effluents by clarification or filtration. Specific methods of metals removal include activated carbon, ion exchange, precipitation, electrodialysis, electrolytic recovery and reverse osmosis.

Biological treatment technologies include activated sludge systems, extended aeration, rotating biological contactors, trickling filters and lagoons. The majority of both municipal and industrial applications use the activated sludge or extended aeration technology.

The conventional activated sludge system involves aeration of a suspended growth culture and wastewater in tanks or basins with about 6 to 12 hours holdup time. In extended aeration, the holdup times are extended to periods approaching 5 to 6 days. These systems are capable of achieving high levels of priority pollutant removal.

Physical-chemical treatment technologies utilized by the industry include flow equalization, neutralization, oily water separation, sedimentation/clarification, dissolved air flotation, filtration, reduction, coagulation, flocculation, steam and air stripping, distillation and adsorption using activated carbon or ion exchange resins. Generally, these technologies are applied to recover products or by-products, to reduce loadings to a biological treatment plant or to remove pollutants for which biological treatment may be ineffective.

Activated carbon has been used successfully in conjunction with aerobic treatment to remove difficult to treat pollutants. However, activated carbon applications are limited by the high costs of both carbon and energy for reactivation. Physical-chemical treatment alone, other than activated carbon, generally will not provide sufficient removal of pollutants from wastewater.

2.2 THE ORGANIC CHEMICAL MANUFACTURING (OCM) SECTOR

General

The organic chemical manufacturing industry in Canada is large and diverse, consisting of approximately two hundred and seventy plants. About one hundred and forty of the plants are located in Ontario. Twenty-six of the Ontario plants are classified as direct dischargers and are included in the OCM Sector for limits regulation under the MISA program.

Almost all of the Sector plants are located along the Great Lakes basin from the St. Clair River at Sarnia in the west to the St. Lawrence River at Cornwall in the east. Individual plant locations are shown in Figure 2-3.

Past and present studies by the Ministry and Environment Canada have identified two major areas of environmental concern related to discharges from OCM Sector plants. The St. Clair River at Sarnia is a concern because of discharges of chlorinated and aromatic compounds. The Cornwall area of the St. Lawrence River is also a concern because of past discharges of heavy metals.

Sector Overview

The twenty-six plants making up the OCM Sector are unique as to products, processes, water use and effluent treatment. The range of products manufactured by the plants includes:

- fibres (nylon, polyester and spandex)
- films/sheets (polyethylene, nylon, acrylic, polycarbonate)
- plastics (PVC, ABS, polyethylene, polystyrene, polyurethane, epoxy and engineering resins)
- synthetic rubbers/rubber belting
- synthetic detergent/fabric softener bases
- stains, sealers and emulsions for coatings, paints and adhesives
- chlorinated solvents
- gasoline/oil additives
- plastic/fabric laminates
- agricultural - seed fumigants, fungicides

Information on the number of employees, raw materials, products and end-of-pipe treatment specific to each of the OCM Sector plants is shown in Table 2-1.

Figure 2-3: Organic Chemical Manufacturing Sector Plant Locations

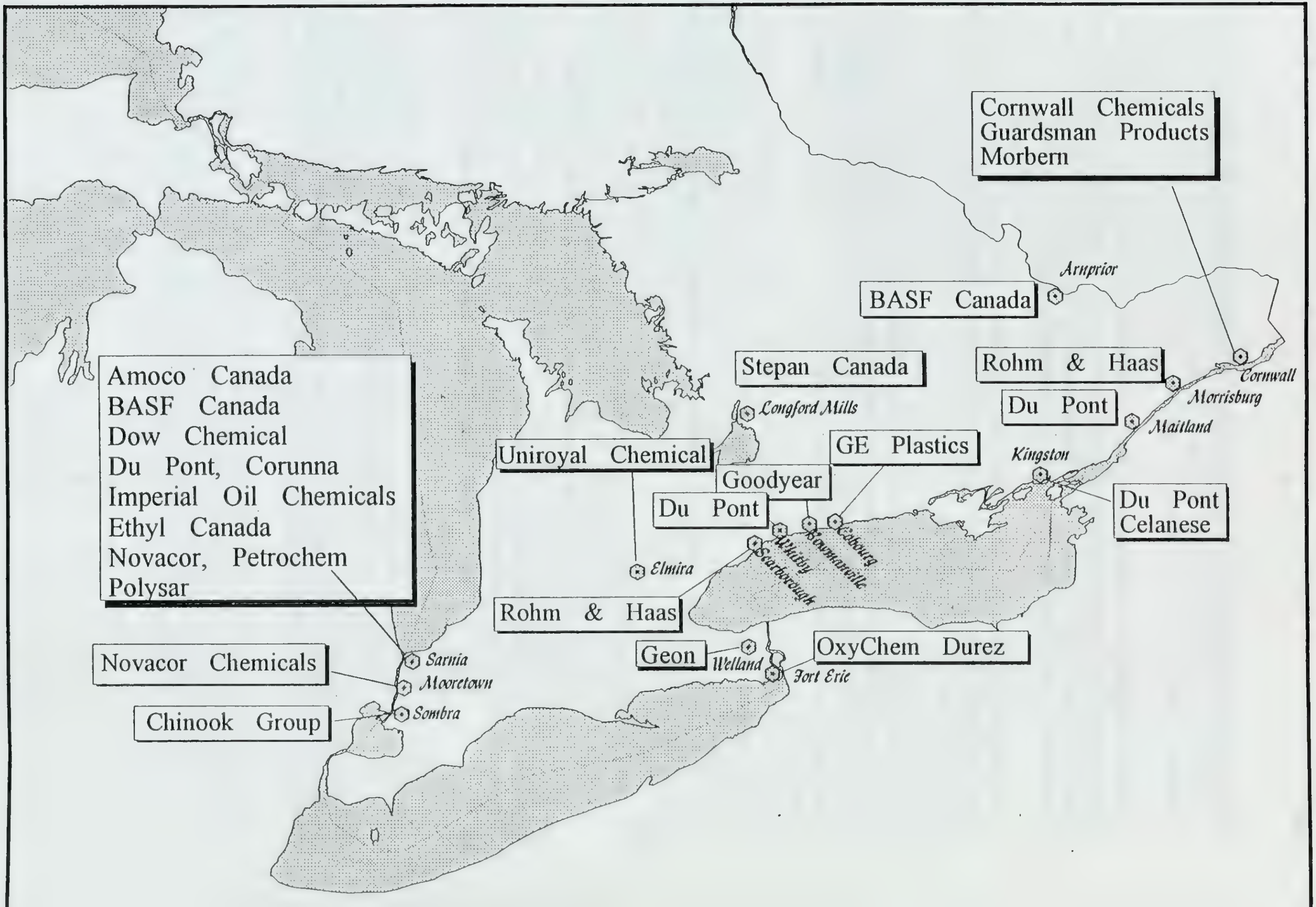


Table 2-1 OCM Sector Plant Overview

Plant Name	Location / Basin	No. of Emp	Major Raw Materials	Intermediate & Final Products	End of Pipe Treatment	No. of Outfalls
Amoco Canada Resources Ltd.	Sarnia / St.Clair River	70	Natural Gas Liquids by Pipeline	Propane, Isobutane, n-Butane, Hydrocarbon Condensate	Oil Separation	1
BASF Canada Inc.	Amprior / Ottawa River	350	Caprolactam Monomer, Nylon Chips	Nylon 6 Carpet Fibre, Nylon 6 Resin	Municipal Treatment	1
BASF Canada Inc.	Sarnia / St.Clair River	90	Styrene, Butadiene	Styrene-Butadiene Latex	Biological @ Polysar	2
Celanese Canada Inc.	Millhaven / Lake Ontario	630	Ethylene Glycol, Terephthalic Acid	Polyester Staple	Biological Treatment	2
Chinook Group Limited	Sombra / St.Clair River	50	Methanol, Ammonia, Methyl Formate, Hydrochloric Acid, Ethylene Oxide	Alkyl Amines, Dimethyl Formamide, Choline Chloride	Settling and Spray Irrigation	1
Cornwall Chemicals Ltd.	Cornwall / St.Lawrence River	70	Sulphur, Chlorine, Natural Gas	Carbon Disulphide, Carbon Tetrachloride	None	1
Dow Chemical Canada Inc.	Sarnia / St.Clair River	800	Ethylene, Benzene, Propylene Oxide	Ethylbenzene, Styrene, Polystyrene Polyethylene, Acrylic Latex, Epoxy Resins, Propylene Oxide Derivatives,	Biological Treatment, Activated Carbon	6
Du Pont Canada Inc.	Corunna / St.Clair River	260	Ethylene, Cyclohexane, Butene, Octene	Polyethylene	Settling and Oil Skimming	1
Du Pont Canada Inc.	Kingston / Lake Ontario	1800	Adipic Acid, Hexamethylene Diamine	Nylon 66 Yarn & Resin	Trickling Filter, Municipal Treatment	2
Du Pont Canada Inc.	Maitland / St.Lawrence River	700	Cyclohexane, Nitric Acid, Adiponitrile, Ammonia, Hydrogen Fluoride, Tetrachloroethylene, Chlorine, Substituted Diisocyanate, Glycol, Anthraquinone, Hydrocarbon Solvent	Adipic Acid, Hexamethylene Diamine, Hydrogen Peroxide, Fluorochemicals, Spandex Fibre, Engineering Resins	Biological Treatment, Oil Separation	1
Du Pont Canada Inc.	Whitby / Lake Ontario	280	Polyethylene Resin, Nylon Flake	Polyethylene Film and Netting, Nylon Film	None	1
Ethyl Canada Ltd.	Sarnia / St.Clair River	170	Lead, Sodium, Ethylene Dichloride, Ethyl Chloride, Ethylene Dibromide, 2-Ethyl Hexanol, Nitric/Sulphuric Acids, Hexane, Toluene, Petroleum Solvents	Tetraethyl Lead, Aluminum Alkyls, Diesel Ignition Improver	Settling, Chemical Reduction, Precipitation, Filtration	1

Table 2-1 OCM Sector Plant Overview

Plant Name	Location / Basin	No. of Emp	Major Raw Materials	Intermediate & Final Products	End of Pipe Treatment	No. of Outfalls
G.E. Plastics Canada Ltd.	Coburg / Lake Ontario	170	ABS Resins	Acrylonitrile-Butadiene-Styrene (ABS) Resins, Polycarbonate Sheet, Polybutylene Terephthalate Sheet	Biological Treatment	2
Geon	Welland / Welland River	215	Vinyl Chloride Monomer	Polyvinyl Chloride (PVC) Resin	Biological Treatment	1
Goodyear Canada Inc.	Bowmanville / Lake Ontario	220	Natural & Synthetic Rubber, Carbon Black, Accelerators, Process Oils, Extenders, Antioxidants	Rubber Belts	Oil Traps on two effluents	7
Guardsman Products Ltd.	Cornwall / St.Lawrence River	134	Toluene, Xylene, Methanol, Isopropanol, Isobutanol, Isobutyl Acetate	Furniture Stains, Sealers and Topcoats, Polyester and Alkyd Resins	None	1
Imperial Oil Chemicals Division	Sarnia / St.Clair River	600	Vinyl Chloride Monomer, Ethylene, Butene, Hexene Aromatic Reformate	Polyvinyl Chloride Resin, Polyethylene, Benzene, Toluene, Xylene Gasoline Fractions, Solvents	Oil Separation, Dual Media Filtration, Activated Carbon	1
Morbern Inc.	Cornwall / St.Lawrence River	234	Vinyl Chloride Resin, Plasticizers, Pigments, Fabric	Vinyl Coated Fabric	None	1
Novacor Chemicals Ltd.	Mooretown / St.Clair River	200	Ethylene, Butene, Hexene	Polyethylene	Settling, Filtration	1
Novacor Chemicals Ltd. Petrochem. Div.	Sarnia / St.Clair River	80	Ethylene, Benzene	Ethylbenzene, Styrene	Biological @ Polysar	none
Oxychem Durez Canada	Fort Erie / Niagara River	40	Phenol, Formaldehyde	Phenol-Formaldehyde Resins	Municipal Treatment	none
Polysar Rubber Corporation	Sarnia / St.Clair River	2000	Crude Butadiene, Benzene, Ethylene, Butene, Isoprene, Methyl Chloride, Isopropyl Alcohol, Acetonitrile, Hexane, Chlorine, Bromine, Acrylonitrile, Cyclohexane	Butadiene, Isobutylene, Rubbers: Polybutadiene, Styrene-Butadiene, Bromobutyl, Chlorobutyl, Butyl, Acrylonitrile-Butadiene	Biological Treatment	9
Rohm & Haas Canada Inc.	Morrisburg / St.Lawrence River	140	Methyl Methacrylate, Acrylic Polymer, Methacrylic Acid Esters	Acrylic Sheet, Oil Additives	Oil Separation	1
Rohm & Haas Canada Inc.	Scarborough / Lake Ontario	175	Acrylonitrile, Ethyl and Butyl Acrylate, Ethyl Methacrylate, Styrene, Vinyl Acetate, Soya Oil, Formic Acid, Hydrogen Peroxide	Acrylic, Styrene and Vinyl Emulsions, Soya Oil Plasticizer	Municipal Treatment	none

Table 2-1 OCM Sector Plant Overview

Plant Name	Location / Basin	No. of Emp	Major Raw Materials	Intermediate & Final Products	End of Pipe Treatment	No. of Outfalls
Stepan Canada Ltd.	Longford Mills / Lake St. John	70	Linear Alkyl Benzenes, Detergent Alcohols, Sulphur, Phenol, Nonene, Ethylene Oxide, Ethanolamines, Natural Long Chain Oils and Fatty Acids	Detergent Bases, Wetting Agents, Emulsifying Agents	Biological Treatment	1
Uniroyal Chemical Ltd.	Elmira / Grand River	250	Acetoacetanilide, Ammonia, Toluene, Sulphuryl Choride, Morpholine, Decene, Mercaptobenzothiazole, Acetaldehyde, Aniline, Acetone	Rubber Accelerators and Antioxidants, Seed Fungicide, Food Flavouring Agents, Synthetic Oils	Biological Treatment, Activated Carbon, Ultraviolet, Municipal Treatment	2

Water Use

The OCM Sector plants use large volumes of water in the manufacture of their products. The primary use of the water is for non-contact cooling. Water is also used for direct contact process cooling, process reaction, utilities (steam), maintenance and housekeeping and environmental control in devices such as air scrubbers.

Water usage in the OCM Sector typically ranges from 200,000 to 900,000 m^3/day for the large manufacturing complexes to 100 - 500 m^3/day for the smallest plants.

Control of Discharges

Sector plants currently treat their process effluents in several ways. Typically, control is achieved by end-of-pipe biological treatment, end-of-pipe activated carbon adsorption, in-plant pollution prevention and recycle, or physical-chemical treatment.

Plants in the Sector

The list of plants in the OCM Sector subject to the limits regulation has changed since the 1989-91 regulatory monitoring period. Of the twenty-eight plants originally included under the MISA monitoring regulation, four have shutdown operations. These included the following plants with the shutdown dates shown in brackets:

- Courtaulds Films Canada (1989)
- BTL Specialty Resins (1990)
- Akzo Chemicals Ltd. (1992)
- Courtaulds Fibres Canada (1992)

Two plants have been added to the Sector for limits:

- Novacor Chemicals (Canada) Ltd., Sarnia plant
- Goodyear Canada Inc., Bowmanville

The Novacor Sarnia plant is a producer of styrene. The plant was part of the Polysar complex during the monitoring period but remained with Nova Chemicals when Polysar was sold to Bayer AG in 1990.

The Goodyear plant in Bowmanville compounds various rubbers to produce rubber belting material.

2.3 INDIVIDUAL OCM SECTOR PLANT DESCRIPTIONS

The Site Visit Report

A detailed description of plant processes and water management policies covering all plants currently in the Sector, except the Goodyear plant, is provided in a report[13] prepared for the Ministry by Science Applications International Corporation (SAIC). A brief summary of operations at the Goodyear plant in Bowmanville is provided in this section to complete the individual plant overviews.

The information in the SAIC Report was obtained from the Initial Reports submitted by plants under the MISA monitoring regulation and was verified and updated through follow-up plant visits by Ministry and SAIC staff. The report reflects operations at each plant as of March-May 1991.

Significant changes to either plant processes, water use or effluent treatment that have occurred since the writing of the SAIC report are highlighted in this section for each affected plant. In general, the types of changes that have occurred have been the result of the following types of activities:

- process unit changes -- unit shutdowns and start-up of new processes
- improvements to in-plant treatment
- upgrading of effluent treatment facilities
- stream separation and re-routing to treatment
- pollution prevention -- installation of new non-polluting equipment, secondary cooling systems, storm water and spill containment, water reduction and re-use.

Changes at Sector Plants

Changes to operations at Sector plant sites since the Spring of 1991 which may impact the limit setting process are highlighted in point form in this section.

Geon Canada Inc.,(formerly B.F. Goodrich Canada Inc.) - Niagara Plant

- the plant name was changed as of March 5, 1993 to Geon Canada Inc. -- a wholly owned subsidiary of B.F. Goodrich Inc.

- expansion of the biological treatment plant was completed in third quarter of 1990

- expansion of production facilities to double previous capacity was completed by the first quarter in 1991

- storm water was separated from the plant water sewer in July 1992.

Celanese Canada Inc. - Millhaven Site

- the heavy decitex industrial (HDI) yarn production unit representing about 30% of plant fibre capacity was mothballed in October 1992 resulting in the elimination of the east outfall discharge.

Dow Chemical Canada Inc. - Sarnia Site

- three process effluents from the Styrene, HDPE and Latex Units were rerouted to biological treatment -- October 1989, December 1989, March 1990 respectively
- the 42" outfall was cemented shut -- November 1991
- with a major corporate downsizing, the following production units have been shutdown over the period May 1992 to June 1993 -- Solvents, Chloroethene, Vinyl, Propylene Oxide, Chlor-Alkali
- the biological treatment plant has been converted from salt water to fresh water operation in June 1993
- the Throx Unit was shutdown in July 1993
- the site is committed to its River Separation Project which when completed in the year 2000 will leave the site with three outfalls -- central treatment, once-through cooling water and the Scott Road landfill treatment effluent

Dupont Canada Inc. - Corunna

- as of July 1994, the Dupont polyethylene plant was sold to Novaçor Chemicals Ltd. Dupont's Modified Polymers (MP) operation was not part of the sale and remains a dupont facility. The MP facility will discharge a small amount of cooling water into the Novacor effluent for which Novacor has agreed to be responsible
- any references to the Dupont plant at Corunna should now be interpreted as referring to the Novacor Chemicals Ltd., St. Clair River Site at Corunna.

Dupont Canada Inc. - Kingston Site

- two of three nylon staple lines have been shutdown with the remaining line discharging once-through cooling water only -- effluent limits for the staple effluent are no longer applicable.

Dupont Canada Inc. - Maitland Site

- the production of chlorofluorocarbons (CFCs) at the site has been discontinued as of January 1993
- the CFC facilities have been converted to produce a CFC alternative, dichloro-trifluoroethane (HCFC-123) and became fully operational in February 1993.

Ethyl Canada Inc. - Sarnia Site

- the site has made major additions and modifications to its lead alkyls effluent treatment system -- a new clarifier, improvements to the soluble lead removal system, a new volatile organics stripper -- on line December 1992
- lead alkyls effluent discharge has been converted to a batch discharge through the use of three new holdup tanks which allow sampling and analysis prior to discharge.
- the ethyl chloride plant was mothballed in May 1993
- the full scale manufacture of lead alkyls was stopped in March 1994; working-off raw materials and in-process inventory and equipment decontamination requirements will produce occasional batches (1 every 6 to 8 weeks) for about a year.

G.E. Plastics - Cobourg Site

- the manufacture of Acrylonitrile-Butadiene-Styrene (ABS) resins was discontinued in April 1992
- the site currently imports (ABS) resin for compounding only
- the plant's wastewater treatment plant was upgraded with the start-up of a new diffused air aeration basin in June 1992
- production of Lexan™ and Valox™ polycarbonate and polybutylene terephthalate sheet from imported resin was begun in the summer of 1991
- the sheet processes have the potential to add methylene chloride, tetrahydrofuran and methanol to the wastewater treatment plant feed
- current flows to the wastewater treatment plant have been reduced by about seventy percent over the flows during the monitoring period.

Polysar Rubber Corporation - Sarnia

- the Stereo Crumb Separator stream has been diverted from the seventy-two inch sewer to the biological treatment plant

- a closed loop cooling water system using plate and frame heat exchangers and water circulating pumps has been installed for all hydrocarbon heat exchangers in the butadiene rubber production unit -- this will prevent hydrocarbon exchanger leaks from ending up in the river.

Rohm & Haas - West Hill Plant

- installation of a storage tank to hold chilled water for re-use has eliminated discharges of cooling water from the plant; cooling water may still be discharged during plant power outages because of the need to rapidly cool polymerization reactors.

Uniroyal Chemical Ltd. - Elmira

- the water flow to outfall #6 has been eliminated and the line has been cemented

- flow at outfall #11 has been eliminated -- the cooling tower blowdown, and water softener backwash, are being routed to the sanitary sewer; dryer hot water tank overflow in being discharged to the on-site wastewater treatment facility

- recycled cooling water from Bldg 28 is to be discharged to Shirt Factory Creek by means of a new overhead line.

Goodyear Canada Inc. - Bowmanville Plant

The Goodyear plant is located along Bowmanville Creek in the town of Bowmanville, east of Oshawa. The plant employs about 220 people.

The plant produces various types of rubber belts, typically for industrial conveyor belt applications. Carbon black, rubber accelerators, extenders, stabilizers and process oils are blended with natural and synthetic rubbers in mixers and rolls mills to produce sheet stock.

The sheet stock is calendered and sent for curing in any one of five vulcanizing presses. The cured sheet is then rolled up, inspected and shipped. The plant also operates a small rubber cement solution batch reactor operation.

Steam and compressed air is supplied from an on-site powerhouse. Water mainly for non-contact cooling of mill rolls and presses is pumped from Bowmanville Creek. Some municipal water is used for sanitary purposes and for a few specific uses such as make-up water for two dip tanks at the batchoff mills, make-up water for cold end tanks of the vulcanizing presses, and for solution preparation in the rubber cement operation.

The plant has ten outfalls to Bowmanville Creek. Three of the outfalls are storm discharges, while the other seven discharge cooling water. Some discharges are intermittent. Two of the seven outfalls have oil traps while another outfall discharges boiler blowdown. Plans are currently underway to rationalize the number of outfalls.

Because the plant was not included for regulatory effluent monitoring, the only database on discharges is available from plant supplied analyses of a limited number of parameters and from three Ministry EMPPL characterizations in the 1991-92 period. Typical contaminants found included DOC, TSS, phenolics, sulphides and oil and grease. With the exception of bis-2-ethylhexylphthalate and aluminum no EMPPL parameters were found in the Ministry effluent characterizations.

3.0 SECTOR DATABASE

Introduction

This section describes the generation of the OCM Sector database which was used in the development of the limits regulation for the Sector.

The requirements for the sector twelve-months of regulatory monitoring were developed on the basis of short term pre-regulation plant supplied effluent characterization and historical monitoring data.

The purpose of the Monitoring Regulation was to establish the parameters being discharged in the Sector effluents, their long term (twelve month) concentration and loading values and the variability associated with those values.

The data collected from the twelve months of monitoring was used as the basis for the selection of parameters for limits at each plant and for comparison of levels of these parameters in plant effluents versus levels from plants operating Best Available Technology.

3.1 PRE-MONITORING REGULATION DATA

As part of the pre-monitoring regulation requirement, plants provided short term effluent characterization data covering four periods of twenty-four hours. The effluents were analyzed for the U.S. EPA list of 126 priority pollutants and standard conventional parameters. The U.S. EPA list of parameters was used because the Ministry Effluent Monitoring Priority Pollutants List (EMPPL) was not available at the start of the pre-regulation characterization program. The voluntary monitoring data were obtained in the period from December 1986 to August 1987.

The Ministry also obtained its own twenty-four composite samples as part of the pre-monitoring regulation program on one of the days that the plant was collecting its sample. The Ministry samples also underwent open characterization (gas chromatographic/mass spectrometric analysis) to identify any compounds not on the EMPPL.

As part of the pre-monitoring regulation program, plants also provided information on their processes, raw materials, products, wastewater treatment and levels of contaminant discharges.

The monitoring and operations data was supplemented by other data from the following sources:

- IMIS (Industrial Monitoring Information System)
- NIAMIS (Niagara River Monitoring Information System)
- pilot site studies (St. Clair River MISA Pilot Site Investigations - November 1987; St. Lawrence River Environmental Investigations - February 1988)
- MOE historical survey data/regional reports
- Environment Canada Surveys (Upper Great Lakes Connecting Channel Study (UGLCCS)
- U.S. EPA Master Process File
- Best professional judgement (BPJ) based on knowledge of process chemistry, products, by-products, catalysts and raw materials for each site.

Detailed information supporting the development of the monitoring regulation can be found in the development document[6] which was released as part of the monitoring regulation package.

3.2 THE MONITORING REGULATION DATA

Regulatory Monitoring Requirements

The OCM Sector MISA monitoring data was collected under sector-specific Ontario Regulation 209/89 and its three amendments -- Ontario Regulations 532/89, 45/90 and 416/90 and the General Effluent Monitoring "how to" regulation covering all nine sectors -- Ontario Regulation 695/88 and its amendment 533/89.

The sector regulation set out plant specific monitoring schedules covering parameters for monitoring and frequencies of monitoring. The regulation also required the collection of monthly and quarterly field Quality Assurance/Quality Control (QA/QC) samples.

The General Regulation specified sampling and analytical principles, analytical method detection limits (RMDL -- Regulation Method Detection Limits) and flow accuracy requirements.

The regulatory twelve-month monitoring period for twenty-two OCM Sector plants began on October 1, 1989. Subsequently, five more plants began twelve months of regulatory monitoring on February 1, 1990 with a sixth plant starting on August 1, 1990.

The basic OCM Sector list of parameters for monitoring consisted of one hundred and fifty-five parameters including fourteen conventional and one hundred and forty-one EMPPL parameters. All of the parameters on the OCM Sector List were required to be monitored at least semi-annually with most plants being required to do full-list quarterly monitoring. Sub-sets of the list, specific to each site were set out for daily, thrice weekly, weekly or monthly monitoring.

Streams monitored included process effluents, once-through cooling water, storm water, waste disposal site effluents and emergency overflows.

Intake water monitoring was not a regulatory requirement but was done on at least a monthly frequency by all but six of the twenty-six plants.

The monitoring regulation also required that each plant test its final discharges for acute lethality using rainbow trout and Daphnia magna at a monthly frequency for process outfalls and quarterly for once-through cooling water.

Throughout the monitoring period, Regional Operations MISA staff ensured compliance with regulatory requirements through periodic plant inspections and effluent sampling.

A complete description of the rationale supporting the monitoring regulation can be found in the monitoring regulation development document[6].

Database Description

Each plant was required to submit its monitoring data to the Regional Ministry Office within 60-90 days of sample collection on computer diskettes. The submitted data were checked for completeness by Regional staff before being entered into the Ministry central computer Sample Information System (SIS).

The regulatory monitoring data was analyzed in two lots. The first covered the initial six months of monitoring from October 1, 1989 to March 31, 1990. The second covered the full twelve months of data for each plant.

The procedures for analysing the data were the same in both cases. The data were downloaded from the mainframe SIS computer in the form of individual values. The data were verified with each plant, corrected where required and finalized as validated data. Statistical calculations were carried out using SAS software. Typical summary statistics included data counts, data value classification with respect to RMDL's, minima/maxima, monthly and annual (long term) averages, standard deviations, data distribution fits, and percentile values (P99 and P95) with their associated variability factors.

Both the six-month and twelve-month databases were published as a Ministry Reports[7,9] in February and September 1992, respectively.

The twelve month database was used as the basis for the final statistical calculations to produce current performance data in support of the limit setting process.

The twelve-month sector database consisted of approximately 438,000 points including about 107,000 field QA/QC and 19,000 Ministry inspection data.

A full discussion of the results of the twelve months of monitoring can be found in the Twelve Month Monitoring Data Report.[9] The Report provides for each of the monitored plant effluents, a table of all found parameters and their twelve month average concentrations and loadings.

Assessment of the twelve-month field QA/QC data was done to provide an insight as to the "goodness" of the twelve-month monitoring database to ensure that only valid data were used in the development of limits. The assessment report entitled, "Report on the Assessment of the Quality Assurance and Quality Control Data for the Organic Chemical Manufacturing Sector".[8] confirmed that the OCM Sector monitoring data were acceptable for use in the development of limits. Four tables in the results section of the report identify respectively:

- parameters requiring discretion for limits use
- parameters where the Laboratory Detection Limits were above the Regulation Method Detection Limits
- parameters with high laboratory blank corrections
- parameters with under-recoveries of travelling spiked blanks

The classification of parameters as found was based on the 90/10 Edit Rule[****] developed in the Issues Resolution Committee (IRC) process.

The Ministry consultant, contracted to carry out a global inventory of Best Available Technology (BAT) applicable to the OCM Sector plants, was provided with the performance data (effluent twelve-month concentrations/loadings) for each parameter found at each of the sector plants. The data were to be the basis upon which the consultant could determine if other effluent treatment technologies, identified through the global BAT search, would provide improved treatment and to what extent.

The individual plant found parameter tables were combined into a Sector Matrix of Found Parameters (Table 2 of the Twelve Month Report[9]) which shows the plants where each of the parameters were found. The matrix is reproduced as Table 3-1 in this section for the plants currently in the Sector.

The matrix and the individual plant tables of found parameters were to serve as the starting points for the development of a list of parameter to be limited at each plant under the OCM Sector Limits Regulation.

[****] A monitored parameter is considered to be present (found) unless a statistical proportion of 0.9 of the parameter analytical data (at a 95% confidence level) is at concentrations less than the Regulation Method Detection Limit (RMDL)

TABLE 3–1 Matrix of Contaminants Found in OCM Sector Plant Effluents during the Monitoring Period

RECEIVING WATERCOURSE			■	◆	○	■	◆	◆	■	○	■		◆	○	◆	■		◆	○	○	■		○	◆	◆	◆	Total
ATG	PARAMETER / COMPANY ID.	Env. Fate	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Sites
1	COD	C	▨	▨				▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨			▨	▨	▨		▨	▨	18
2	Cyanide Total	NC	▨	▨				▨			▨			▨		▨		▨					▨	▨			9
3	Hydrogen ion (pH) *	C							▨	▨	▨			▨		▨	▨				▨				▨	▨	9
4	Ammonia plus Ammonium	C		▨				▨	▨		▨		▨	▨			▨	▨			▨	▨	▨		▨	▨	13
4	Nitrate+Nitrite	C		▨				▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨			▨	▨	▨	▨	▨	▨	18
4	Total Kjeldahl Nitrogen	C	▨	▨	▨	▨		▨	▨	▨	▨	▨	▨	▨			▨	▨			▨	▨	▨	▨	▨	▨	19
5	DOC	C	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	24
5	TOC	C	▨	▨	▨			▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨		▨	▨	▨		▨	▨	20
6	Total phosphorus	C	▨	▨	▨			▨	▨	▨	▨		▨	▨			▨	▨	▨		▨	▨	▨		▨	▨	17
7	Specific conductance **	C	▨	▨					▨	▨	▨			▨			▨	▨			▨	▨	▨		▨	▨	13
8	Total suspended solids	C	▨	▨		▨		▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨			▨	▨	▨		▨	▨	19
8	Volatile suspended solids	C		▨				▨	▨	▨	▨	▨	▨	▨			▨	▨				▨			▨		12
9	Aluminum	P–UB	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	24
9	Beryllium	P–UB								▨									▨								2
9	Boron	P–NB	▨	▨						▨	▨		▨	▨			▨			▨		▨			▨	▨	11
9	Cadmium	P–UB								▨								▨	▨								3
9	Chromium	P–UB					▨		▨		▨			▨			▨										5
9	Cobalt	P–NB												▨								▨					2
9	Copper	P–UB	▨		▨	▨		▨	▨	▨	▨	▨	▨	▨	▨	▨	▨		▨	▨			▨		▨	▨	18
9	Lead	P–UB				▨					▨						▨										3
9	Molybdenum	P–NB	▨	▨						▨	▨								▨			▨					6
9	Nickel	P–B								▨	▨			▨			▨					▨			▨		6
9	Thallium	P–UB								▨							▨										2
9	Vanadium	P–UB			▨					▨	▨			▨													4
9	Zinc	P–NB	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	24
10	Antimony	P–B						▨						▨				▨				▨					4
10+	Arsenic	P–NB	▨						▨					▨													3
11	Chromium (hexavalent)	P–UB		▨				▨	▨	▨												▨			▨		6
12+	Mercury	P–B	▨					▨		▨	▨		▨				▨	▨								▨	8
13	Tetra–alkyl lead (Total)	P–UB															▨										1
13	Tri–alkyl lead (Total)	P–UB															▨										1
14	Phenolics (4AAP)	NC	▨	▨	▨	▨	▨	▨		▨	▨	▨	▨	▨	▨	▨	▨	▨		▨	▨	▨	▨	▨	▨	▨	22
15	Sulphide	NC	▨	▨				▨	▨	▨	▨	▨	▨	▨			▨	▨			▨	▨	▨		▨	▨	16

TABLE 3–1 Matrix of Contaminants Found in OCM Sector Plant Effluents during the Monitoring Period

RECEIVING WATERCOURSE			■	◆	○	■	◆	◆	■	○	■		◆	○	◆	■		◆	○	○	■		○	◆	◆	◆	Total
ATG	PARAMETER / COMPANY ID.	Env. Fate	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Sites
16	1,1,2,2–Tetrachloroethane	P–NB									▨		▨	▨			WE					▨					5
16	1,1,2–Trichloroethane	NP–UB									▨		▨	▨			WE					WE					5
16	1,1–Dichloroethane	P–NB	▨								▨	▨	▨	▨			▨					WE					7
16	1,1–Dichloroethylene	NP–UB									▨			WE			WE					WE					4
16	1,2–Dichlorobenzene	NP–UB	▨											WE			WE					WE					4
16	1,2–Dichloroethane	P–NB						▨			▨	▨	▨	▨			WE			▨		WE					8
16	1,2–Dichloropropane	UP–UB									▨		▨	▨			WE					WE					5
16	1,3–Dichlorobenzene	NP–UB												WE			WE					WE					3
16+	1,4–Dichlorobenzene	NP–B	▨											WE			WE					WE					4
16	Bromodichloromethane	P–NB	▨					▨	▨	▨	▨		▨	▨	▨	▨	WE			▨	▨	▨	▨				14
16	Bromoform	UP–UB									▨		▨	▨			WE					▨					5
16	Bromomethane	UP–NB											▨	▨			WE			▨		▨					5
16	Carbon tetrachloride	P–NB	▨							▨	▨			▨			WE					WE			▨		7
16	Chlorobenzene	P–NB	▨										▨	▨			WE					▨					5
16	Chloroform	UP–NB	▨	▨				▨	▨	▨	▨	▨	▨	▨	▨	▨	▨			▨	▨	▨	▨		▨	▨	18
16	Chloromethane	P–NB						▨	▨	▨	▨	▨	▨	▨			▨					▨					9
16	Cis–1,3–Dichloropropylene	NP–NB									▨		▨	▨			WE					WE					5
16	Dibromochloromethane	P–NB									▨		▨	▨	▨		WE			▨	▨	▨	▨				9
16	Ethylene dibromide	UP–UB											▨	▨			▨					WE					4
16	Methylene chloride	UP–UB		▨				▨	▨	▨	▨	▨	▨	▨			▨					WE				▨	11
16	Tetrachloroethylene	NP–NB								▨	▨		▨	▨		▨	WE					WE					7
16	Trans–1,2–Dichloroethylene	P–NB												WE			WE					WE					3
16	Trans–1,3–Dichloropropylene	NP–NB											▨	▨			WE					WE					4
16	Trichloroethylene	NP–NB		▨						▨	▨			WE			WE					WE					6
16	Trichlorofluoromethane	P–NB											▨	▨			WE					WE					4
16	Vinyl chloride	NP–NB		▨							▨		▨	▨		▨	WE					WE					7
17	Benzene	NP–NB	▨					▨	▨		▨		▨	▨		▨	WE			▨		▨				▨	11
17	Ethylbenzene	NP–NB				▨					▨		▨	▨			WE					▨	▨				7
17	Styrene	UP–NB				▨					▨		▨	▨			WE					WE					6
17	Toluene	NP–UB	▨	▨		▨		▨				▨	▨	▨		▨	▨		▨	▨		▨	▨			▨	14
17	m–Xylene and p–Xylene	UP–NB	▨								▨			WE		▨	WE					WE	▨				7
17	o–Xylene	UP–NB	▨								▨		▨	▨		▨	WE	▨		▨		WE	▨				10
18	Acrolein	UP–NB											▨	WE								WE					3
18	Acrylonitrile	UP–UB				▨							▨	WE								WE					4

TABLE 3-1 Matrix of Contaminants Found in OCM Sector Plant Effluents during the Monitoring Period

RECEIVING WATERCOURSE			■	◆	○	■	◆	◆	■	○	■		◆	○	◆	■		◆	○	○	■		○	◆	◆	◆	Total
ATG	PARAMETER / COMPANY ID.	Env. Fate	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Sites
19	1-Methylnaphthalene	NP-NB															▨										1
19	2,6-Dinitrotoluene	UP-NB									▨																1
19	2-Chloronaphthalene	P-B									▨																1
19	2-Methylnaphthalene	NP-B															▨										1
19	Acenaphthene	NP-NB															▨										1
19	Benzylbutylphthalate	NP-UB							▨		▨						▨										3
19	Biphenyl	NP-B						▨			▨		▨				▨										4
19	Bis(2-chloroethyl)ether	P-NB									▨																1
19	Bis(2-chloroisopropyl)ether	P-NB									▨																1
19	Bis(2-ethylhexyl) phthalate	NP-B						▨	▨		▨		▨		▨	▨					▨	▨				▨	9
19	Di-n-butyl phthalate	NP-B						▨			▨																2
19	Di-n-octyl phthalate	NP-UB													▨												1
19	Diphenyl ether	P-B							▨				▨	▨	▨												4
19	Fluoranthene	P-B													▨												1
19	Fluorene	NP-UB															▨										1
19	Indole	P-NB															▨										1
19	N-Nitrosodi-n-propylamine	NP-NB									▨																1
19	Naphthalene	UP-NB									▨						▨										2
19+	Phenanthrene	P-B															▨										1
20	2,3,4,5-Tetrachlorophenol	NP-B									▨																1
20	2,3,4-Trichlorophenol	NP-NB									▨																1
20	Phenol	NP-NB									▨						▨										2
20	m-Cresol	NP-NB															▨										1
20	o-Cresol	NP-NB															▨										1
20	p-Cresol	NP-NB															▨										1
23	1,2,3,4-Tetrachlorobenzene	P-B						▨																			1
23	1,2,3,5-Tetrachlorobenzene	P-B						▨																			1
23	1,2,3-Trichlorobenzene	NP-NB	▨					▨		▨																	3
23	1,2,4,5-Tetrachlorobenzene	P-B									▨																1
23	1,2,4-Trichlorobenzene	NP-UB						▨	▨		▨			▨								▨					5
23	2,4,5-Trichlorotoluene	P-B									▨											▨					2
23+	Hexachlorobenzene	P-B								▨	▨	▨		▨								▨					5
23	Hexachlorobutadiene	UP-NB							▨	▨	▨			▨		▨						▨					6
23	Hexachlorocyclopentadiene	NP-NB								▨	▨																2
23	Hexachloroethane	P-NB								▨	▨	▨		▨		▨						▨					6
23	Octachlorostyrene	UP-B									▨											▨					2
23	Pentachlorobenzene	P-B						▨				▨										▨					3

TABLE 3–1 Matrix of Contaminants Found in OCM Sector Plant Effluents during the Monitoring Period

RECEIVING WATERCOURSE			■	◆	O	■	◆	◆	■	O	■	■	◆	O	◆	■	■	◆	O	O	■	■	O	◆	◆	◆	Total
ATG	PARAMETER / COMPANY ID.	Env. Fate	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Sites
24+	Total T4CDD	P–B											▨	▨													2
24+	Total T4CDF	P–B									▨																1
24+	Total P5CDD	P–B							▨		▨																2
24+	Total P5CDF	P–B									▨																1
24+	Total H6CDD	P–B							▨		▨															▨	3
24+	Total H6CDF	P–B									▨																1
24+	Total H7CDD	P–B								▨	▨	▨	▨													▨	5
24+	Total H7CDF	P–B								▨	▨		▨													▨	4
24+	Total O8CDD	P–B		▨				▨	▨	▨	▨	▨	▨	▨												▨	9
24+	Total O8CDF	P–B									▨			▨												▨	3
25	Oil and grease	C	▨	▨		▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨			▨	▨	▨	▨	▨	▨	21
27+	PCBT	P–B							▨																▨		2
Total Number of Parameters found per site			30	25	9	13	6	35	33	40	77	24	50	67	17	23	70	20	10	14	19	63	23	8	23	28	727

Note: (i) Shading indicates found parameters.
(ii) Parameters found may include any pass–through parameters from intake water.
(iii) WE indicates that the presence or absence of the parameter is uncertain.
* – Shading for pH signifies daily readings outside of range 6.5 to 8.5 (may refer to internal stream or final discharge).
** – Trigger values of 500 uS/cm compares the effluents to conductivity of tap water.
+ – On Primary Candidate Substances List for Bans or Phase–Outs

PLANT SITE CODING

1 – Amoco
2 – Geon Canada
3 – BASF (Sarnia)
4 – BASF (Sarnia)
5 – CanadianOxy
6 – Celanese
7 – Chinook
8 – Cornwall Chemicals
9 – Dow Chemical
10 – Du Pont (Corunna)
11 – Du Pont (Kingston)
12 – Du Pont (Maitland)
13 – Du Pont (Whitby)
14 – Esso Chemical
15 – Ethyl
16 – GE Plastics
17 – Guardsman
18 – Morbern
19 – Novacor
20 – Polysar
21 – Rohm & Haas (Morrisburg)
22 – Rohm & Haas (Scarborough)
23 – Stepan
24 – Uniroyal

Note : Goodyear Canada (Bowmanville) not monitored in the Monitoring Period.
Note : Novacor Styrene II was monitored under Polysar in the Monitoring Period.

RECEIVING WATERCOURSE CODING

■ St. Clair River
O St. Lawrence River
◆ Lake Erie / Lake Ontario Basins

ENVIRONMENTAL FATE CODING

C – Conventional
N – Non (Prefix)
P – Persistent
B – Bioaccumulative
U – Unknown

ie. P–B means Persistent and Bioaccumulative

4.0 BEST AVAILABLE TECHNOLOGY ECONOMICALLY ACHIEVABLE

Introduction

This Section describes the work that was undertaken by an outside consultant, under contract to the Ministry, to provide information on Best Available Technology, its performance and its cost if installed at the Sector plants. The Consultant gathered the information through reviews of literature including U.S. EPA documents and through plant visits in the U.S. and Europe.

4.1 THE MANDATE

The June 1986 MISA White Paper[1] set out the MISA mandate as the virtual elimination of toxic contaminants into Ontario's waterways through limit regulations developed on the basis of Best Available Technology that is Economically Achievable (BATEA). More stringent discharge limits than those based on BATEA could be imposed for sensitive aquatic areas, depending on the water quality impact of the discharges.

While limits would be set on the basis of demonstrated performance of the selected BATEA for the sector, plants were not automatically required to install the model technology. All that would be required is that performance equivalent to the sector BATEA be achieved. How this equivalent performance was to be achieved was left up to the individual plants. This section describes how the BATEA for the OCM Sector was determined.

4.2 THE BATEA STUDY

Because of limited MISA resources and perceived short deadlines, the BAT search and the current Sector plant status determination was contracted to an outside consultant through the Ministry tendering process. The EA study was turned over to the Fiscal Planning and Economic Analysis Branch of the Ministry. The results of the two studies are summarized in this section.

To simplify the task, the BATEA Study was divided into its two separate components -- the BAT search and the financial analysis which would define the EA component.

The BAT component would require a world-wide technical search and evaluation of organic chemical plants similar to those in the Sector focusing on performance and cost of any pollution prevention, Best Management Practices (BMPs) in-plant and end-of-pipe treatment to control discharges. At the same time, the status of the Sector plants with respect to their current operations would also have to be determined to understand how any proposed BAT might be integrated at a site and the cost of such interpretation.

The determination of the Economic Achievability (EA) component would require a financial analysis of the ability of sector plants to support the capital and operating costs of the recommended BAT for the Sector under current business conditions. The EA study results would dictate the level of BAT that the Sector could support financially.

4.3 THE BAT STUDY COMPONENT

The joint proposal for the BAT Study submitted by Science Applications International Corporation (SAIC) (Hackensack, New Jersey) as the prime contractor and CH2M Hill Engineering as its Canadian partner, was judged by the OCM Sector BAT Sub-committee to be the best of the submitted proposals. The contract for the BAT study was signed in February 1991. SAIC had previously assisted the U.S. Environmental Protection Agency (EPA) with the development of its technology based limits for the Organic Chemicals, Plastics and Synthetic Fibres (OCPSF) Sector. The U.S. national limits were documented in the Federal Register (Vol. 52, No., 214), of November 5, 1987.

The Need for the BAT Study

The identification and evaluation of available treatment technology along with its performance and cost would be key to establishing the technology-based limits that OCM Sector plants would be required to meet. The world-wide scope of the BAT search would ensure that no significant technology was omitted.

In anticipation of the varying levels of treatment that would be identified, the BAT study was to categorize the technologies into five defined levels or options based on their level of performance. While plants would not necessarily have to install the recommended BAT, as long as the plant could achieve equivalent performance the fact that a technology was identified would make it demonstrable and its performance at least technically achievable. An integral part of the BAT study was to be the determination of the effluent treatment technology in place at each of the OCM Sector plants through plant visits by the Consultant and Ministry staff.

The Impact of EA on BAT

The determination of the economic health of the Sector plants in conjunction with the costs of installing and operating any recommended BAT would ultimately dictate which level of BAT the sector could afford and thereby dictate the discharge levels that could be achieved. If the recommended BAT was too costly for the Sector, the choice could be to either require a less costly BAT option along with less stringent performance or suffer the closing of some, or in the extreme, all of the Sector plants.

The EA Study, based on plant supplied and public record financial information would provide a series of financial indicators and abatement cost comparisons for each of the BAT levels to allow a decision to be made on their cost effectiveness and viability within the OCM Sector.

BAT Study Background

The BAT Study was carried out by the SAIC Consultant in two parts and documented in two separate reports. The global part required an inventory of demonstrated BAT applicable to the OCM Sector through a search for technologies in Canada, the U.S., Europe and the Far East. Up to five BAT levels or options along with performance and cost were to be provided in accordance with the following performance criteria:

- a least cost BAT option that achieves non-lethality to fish and Daphnia magna
- a BAT option predicted to provide the maximum overall pollution reduction as measured using the U.S. EPA "copper standard" or a near equivalent method of weighting pollutants
- a BAT option(s) selected by the U.S. EPA for the OCPSF Sector in the U.S.
- a BAT option that utilizes the best technology currently in use in the OCM Sector in Ontario
- a BAT option consisting of any current technology or combination of current technologies, including the use of supplemental add-on technologies, or cross-over technologies from other industrial sectors which will advance the Sector plants the furthest towards virtual elimination of the ultimate goal of zero discharge of contaminants.

The Consultant's technology search was to consider technologies connected with:

- pollution prevention aspects (process modifications to reduce or eliminate toxic chemicals)
- in-plant control measures
- water reuse and recycle
- end-of-pipe treatment
- Best Management Practices (BMPs)

The second part of the BAT study required the Consultant to carry out site visits to OCM Sector plants to document the current status with respect to manufacturing processes, water management and effluent treatment in order that the performance and cost of any recommended BAT option could be estimated for each plant.

The Ministry provided assistance to the Consultant throughout the study by:

- providing for each plant, long term concentration and loading data in Lotus table format for all contaminants that were found during the twelve-month regulatory monitoring period
- providing plant information packages on manufacturing processes, water management, and effluent treatment based on the Initial Report submissions which were provided to the Ministry by each plant as a requirement of the monitoring regulation
- providing a copy of a report by Melcer and Osinga[10] with a review of the wastewater treatment plant performance of Sector plants
- attending the plant visits with the Consultant both in Ontario and in the U.S. and by arranging for Environment Canada's assistance for the Consultant's European plant visits.

BAT Study Results

The SAIC Report[11] on the global technology search including the performance and both capital and operating costs of retro-fitting the selected BAT for each sector plant was completed by the Consultant in March 1993 and was accepted for JTC approval. Previously draft information on technology selection and costs had been provided by SAIC on an ongoing basis throughout the study period. The OCM Sector DATABAT Sub-committee reviewed the information and provided comments when required.

SAIC also provided a second report detailing the status of the OCM Sector plants. To ensure accuracy, each plant had been asked by SAIC to review its report and to provide any necessary corrections. A table showing which plants were visited and the dates of the visits is provided in the SAIC Global Search Report. Information from visits to plants in the U.S. and Europe was documented in separate stand-alone SAIC plant visit reports.

The SAIC BAT Options Report[11]

Global Technology Search

Very early in the study, the SAIC consultant concluded that the five BAT Options required by the terms of reference of the Ministry contract could be collapsed to three because of inherent similarity. Ontario Sector plants considered to be operating BAT employed the same technology and achieved the same performance as comparable BAT plants in the U.S. EPA regulated OCPSF Sector. Moreover, the maximum overall pollution reduction requirement of one of the five BAT options had already been taken into account in the U.S. OCPSF technology specification.

The SAIC Report, therefore, identified technology under three BAT options or levels:

- BAT Option 1 - non-lethality to rainbow trout and *Daphnia magna*
- BAT Option 2 - the equivalent of U.S. EPA OCPSF Sector requirements, best in Ontario, and maximum overall pollution reduction
- BAT Option 3 - technology to advance the Sector plants to virtual elimination or zero discharge of contaminants.

The SAIC Report presents a plant by plant summary of the technology required to meet the performance of the three BAT options. The basic control and treatment technologies that were selected for the three BAT Options included:

- Biological Treatment (activated sludge/secondary clarification)
- Biological treatment upgrades
- Chemical precipitation
- Chemically assisted clarification
- Equalization
- Granular Activated Carbon (GAC)
- Multimedia filtration
- Neutralization
- Oil Separation
- Sludge handling and disposal
- Steam stripping
- Vapour Compression Distillation
- Zinc recovery

In cases where the MISA twelve-month monitoring data for some outfalls indicated occasional toxicity to either rainbow trout and/or *Daphnia magna* and where the toxicant was not readily apparent from the analytical data, the SAIC Consultant recommended Toxicity Identification Evaluations (TIEs).

The Report quotes the following data sources used for estimating treatment performance for each BAT Option:

- OCPSF Sector Public Record -- U.S. EPA database
- MISA Twelve-Month Monitoring Report
- Data from U.S./European plant visits
- U.S. EPA -- Risk Reduction Engineering Laboratory (RREL) - Treatability Database (Version 4)
- Treatment Data from other MISA Sector Studies.

The SAIC report includes an appendix where detailed individual plant BAT technology models and available performance data and costs for the three BAT Option levels are presented.

A summary table of BAT Option Models for the purpose of limit setting and cost calculations shown in the SAIC BAT Report is reproduced as Table 4-1 in this section.

Development of BAT Option 2M

In reviewing preliminary cost and performance data supplied by SAIC, it became readily apparent that BAT Option 3 at a capital cost of $674M was unlikely to be economically achievable. A decision was therefore made to review the model technology specified by the Consultant for BAT Option 3 to see if the cost of BAT Option 3 would be reduced without significant compromise of the BAT Option 3 treatment. To this end, the MISA Office developed model technology for BAT Option 2M.

The option was primarily based on the technology, performance and cost of the technologies developed by the consultant for BAT Option 3 except that vapour compression distillation was not specified.

Assumptions/Methods For Cost Estimation

The SAIC Report provides an appendix on BAT costing assumptions and methods. Assumptions used in the costing of each of the treatment technologies are provided. On the basis of the stated assumptions, costs were developed by the Consultant for each level of BAT technology for each Sector plant. The main source of the cost data was the U.S. EPA Development Document for the OCPSF Sector.

The calculated capital and operating costs in 1991 Canadian dollars are shown in a summary table for each plant for each of the four BAT Options in Table 4-1. Costs associated with Courtaulds Fibres Canada and Akzo Chemicals Ltd., have not been included because both plants were shutdown in 1992.

No costs were developed for Goodyear Canada Inc., and the Sarnia styrene plant of Novacor Chemicals Ltd., because the plants were relatively late additions to the Sector. The Goodyear plant is mainly a discharger of cooling water so that capital costs associated with effluent improvement are not expected to be significant. Novacor process effluent is treated by Polysar at its biological treatment plant and therefore no capital expenditures were projected for the Novacor Sarnia plant.

Cost estimates for the development and implementation of Best Management Practices (BMP) Plans and Toxicity Identification Evaluations (TIEs) studies were not developed because it was not possible to obtain the extensive level of technical detail that the Consultant would require on which to develop the cost estimates.

Applicability of BAT Study Cost Data

Each OCM Sector plant was asked to review the BAT Option technology, performance and cost proposed for its operation. Several plants provided improved cost estimates based on the scope of projects they felt would achieve the equivalent BAT Option performance. The EA study took those changes into consideration. The total sector costs for each of the four BAT Options are shown in Table 4-2.

The SAIC BAT Status Site Visit Report[13]

The results of the Consultant-Ministry visits to OCM Sector plants are summarized in the SAIC BAT Status Site Visit Report filed with the Ministry MISA Office in January 1993.

The report presents a detailed description of process and wastewater treatment operations based on plant visits conducted within a period from March 11, 1991 to May 30, 1991. The appendix in the report provides a stand alone report for each Sector plant. Information on each plant is provided under the following headings:

- Plant-Address/Contact/Visit Date
- Plant Description
- Product/Process Description
- List of Chemicals
- Water Management
- Wastewater Treatment
- Monitoring Data
- Best Management Practices
- Conclusions
- Audit Team

The Report also provides background information on how and why the plant visits were conducted. A list of plants in the U.S., Europe and Japan with operations similar to OCM Sector plants is provided. The dates of visits to ten U.S. and European plants are also provided.

Because of the BAT Status Site Visit Information Report contains confidential business information for some plants, the Report will not be printed for general distribution but copies will be on file in the MISA Office.

Any information requests dealing with the material in the Report will be reviewed and accommodated either outside or according to the Ministry's Confidential Business Information Request Procedure.

Current Applicability of the BAT Study

Significant changes affecting plant discharges have occurred since the SAIC BAT Study work was done in 1991-92. Two of the plants, Courtaulds Fibres Canada and Akzo Chemicals Ltd., included under the MISA Monitoring Regulation, have been shutdown due to business reasons unrelated to MISA. Process changes have occurred at other plants. The most significant changes that have occurred, involved either shutdown of some units or start-up of new processes. Other changes have included treatment improvements, waste stream segregation and treatment and water use reductions.

Where new processes were introduced or major process changes took place, effluent monitoring data was required from the plant which, together with Ministry gathered short term data, was used to set discharge limits.

The following is a current list of OCM Sector plants which have undergone significant process changes:

- OxychemDurez (CanadianOxy Chemicals) - conversion to recycle and Municipal treatment -- zero discharge of process and cooling water
- Celanese Canada Inc. - elimination of flow at the CO0300 outfall
- Dow Chemical Canada - shutdown of chlor alkali and chlorinated solvents unit; sewer segregation
- Dupont (Kingston) - staple sewer flow segregation and reduction
- Dupont (Maitland) - shutdown of CFC production; startup of HCFC production
- Ethyl Canada Inc. - shutdown of tetraethyl lead production in March 1994
- G.E. Plastics Canada Ltd. - shutdown of the ABS polymerization and significant reduction of flow and discharges
- Polysar Rubber Corp. - waste segregation and re-routing to biological treatment
- Uniroyal Chemical Ltd. - sewer segregation involving cooling water and storm water

BAT Options and Limit Setting

Since the BAT Study produced four levels of BAT technology, limits could theoretically be developed for each level.

To achieve the BAT Option 1 objective of non-lethality, only one plant was singled out for additional clean up technology with the current performance of the other plants being deemed adequate. This was essentially a status quo option for the sector and if adopted as BATEA would entail setting limits on the basis of current performance.

Both BAT Options 2 and 2M technology would result in significant reductions in contaminants discharged so performance values based on the Consultant specified technology were developed for each plant for both Options for the contaminants found.

BAT Option 3 performance values would be identical to those calculated for BAT Option 2M except for plants where vapour compression distillation technology was specified. The technology would result in zero discharge of contaminants.

4.4 THE ECONOMIC ACHIEVABILITY (EA) STUDY COMPONENT

To develop effluent limits based on BATEA (Best Available Technology Economically Achievable), the Ministry examined the cost to each firm in the OCM Sector of implementing different levels of pollution abatement.

The objectives of the economic assessment were:

- To determine the cost-effectiveness of each of the four options, where cost-effectiveness was defined as the lowest average cost per unit of contaminant removed for each of the four BAT options.
- To determine the incremental (marginal) cost of successively higher levels of contaminant removal for each of the four BAT options.
- To estimate the financial and economic effects of the costs associated with the four BAT options on each plant or, where plant level data was not available, on each firm.
- To analyse the ability of the OCM Sector to pass on the additional costs incurred under the BAT options to its customers, or reduce prices paid for raw materials and other inputs.
- To determine the effects of the program on the ability of the plants and/or firms to remain competitive.

The analysis consisted of the following steps:

- data on the cost to each plant in the sector under each of the four BAT options was developed;

- the costs for each plant were broken down by type of contaminant removed -- conventional[*], non-conventional[**] and EMPPL[***] and by total, including all contaminants;
- using the detailed cost data, least-cost abatement-cost curves were developed for each plant. When plotted, these curves showed the least-cost combination of technologies for each plant to achieve successively higher levels of contaminant reduction.

The analyses considered the cost to each specific plant of removing the contaminants disaggregated by three contaminant groupings -- conventional, non-conventional and EMPPL.

A generic sector approach was not adopted for the Organic Chemical Sector because each of the plants within the Sector was considered to be largely unique in terms of processes and waste water characteristics.

Cost Effectiveness Analysis Of The Four BAT Options

Table 4-3 provides a summary of the costs for each BAT option for the OCM Sector.

BAT Option 1

Cornwall Chemicals is the only plant in the OCM Sector which would be required to incur additional costs as a result of the MISA program under BAT Option 1. Financial data on the company is not available after 1989, and it is therefore not possible to comment on how this plant would respond (in 1994) to the imposition of additional costs under the program.

In any event, the analysis would not be particularly meaningful -- the total loadings reduction for the Sector, under Option 1, is only one-fifth of one per cent of total initial loadings for the Sector.

BAT Option 2

Under BAT Option 2, eleven of the twenty-six plants would incur additional costs to meet the regulated limits.

As shown in the options table, pre-tax capital costs are estimated at $51.6 million and pre-tax operating costs are estimated at $16.1 million per year.

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[*] Conventionals = TKN (Ammonia), DOC, TSS, Phosphorus, Oil & Grease

[**] Non-Conventional = Cyanide, Sulphide, Phenolics

[***] EMPPL = all other contaminants

Given the assumptions about the financing of the pollution abatement equipment -- funds are borrowed at a rate of 12 percent per annum with the debt amortized over ten years, the annualized after tax cost for the entire sector is $15.1 million. A tax rate of 40 per cent was assumed.

It should be noted that the annualized figure can be less than the annual operating figure because the capital and operating figures are pre-tax, while the annualized figure is after tax. For Options 2M and 3, the annualized figure is higher than the pre-tax capital and operating figures, because the capital expenditures (which are debt financed at 12 per cent) are much larger.

BAT Option 2 achieves a 35 per cent reduction in loadings at an average cost of $14.44 per kilogram. This is the lowest cost per unit of reduction of all four options and is therefore the most cost-effective.

BAT Option 2M

Under BAT Option 2M, seventeen plants would incur additional incremental costs to meet the MISA limits. As the options table shows, pre-tax capital costs would be $168.3 million and pre-tax operating costs of $33.7 million per year. The annualized after tax cost would be $38.1 million. Option 2M would reduce initial loadings by 45.8 per cent. The average cost per kilogram removed is $27.90.

BAT Option 3

Under Option 3, all plants in the Sector with the exception of three - BASF (Sarnia), Rohm and Haas (West Hill) and Guardsman, would have to install pollution abatement equipment. This Option is estimated to cost $637.3 million in pre-tax capital cost and $85 million per year in pre-tax operating costs.

Under this option the annualized cost is estimated to be $118.7 million. This figure *understates* the actual cost because some firms could end up in a loss position for several years given the high cost of meeting this limit. The firms would therefore be unable to take advantage of any tax shield provided by the capital financing and operating costs with the result that the after-tax annualized cost could be above $118 million.

Based on the estimated costs provided, the average cost per kilogram of contaminant removed is $69.00.

Summary of the Cost Effectiveness Analysis

The cost-effectiveness analysis calculated an after-tax annualized cost for the OCM Sector and estimated the average cost per kilogram of contaminant removed, based on estimated reductions in the level of initial loadings.

The analysis shows that the most cost-effective option is BAT Option 2, with an average cost of contaminant removal of $14.44 per kilogram.

The analysis also examined the cost-effectiveness for each of the plants in the sector, to determine which of the four options was the most cost-effective. BAT Option 2 was, in all cases, the most cost-effective option. The reasons for this are as follows:

- BAT Option 1 affected only one plant. It was, therefore, irrelevant for the analysis.

- BAT Option 3 required virtual elimination of all contaminants. Estimates by the consultant of the cost to install technologies to meet this limit were extremely high for all plants. This effectively excluded Option 3 from serious consideration.

- BAT Option 2M required similar technologies to be installed as under Option 3, but without the most expensive technologies used under Option 3. The average cost per kilogram removed for specific plants was well above that of Option 2.

Since there were only four options of which three could be effectively excluded, the remaining option -- BAT Option 2 became the most cost effective of the options presented.

The Financial Assessment

In order to assess the potential financial and economic consequences of the costs associated with the implementation of each option, financial impact analyses were undertaken. The analyses were undertaken on fifteen plants for which financial information was available.

In most cases plant level data was not available and the analyses used the financial statements produced by the parent company. The main effect of using consolidated financial statements of the parent company is to *understate* the actual effect of each of the options on the financial position of each plant.

The analysis focused on net income after taxes and five ratios which are generally considered to be key ratios for evaluating the financial position of a firm:

- return on sales
- return on assets
- return on capital
- the current ratio (current assets over current liabilities)
- the quick ratio (current assets less inventories over current liabilities)

Two sets of financial analyses were prepared. The first set estimated the financial effects on each plant using the latest year for which financial information was available for the specific firm. The second set estimated the financial effects based on a ten-year average of the financial performance of the firm. The costs to the plant under each of the four BAT Options were then compared with the base case.

The results indicated that BAT Option 2 (the most cost-effective BAT Option) will not materially affect the financial position of any of the plants in the OCM Sector, based on measures of net income, return on sales, return on assets and return on capital. Liquidity, based on measures of the current ratio and the quick ratio, would also not be materially affected.

Table 4-4 summarizes the financial indicators for the OCM Sector under each of the BAT Options, based on a ten-year average of the financial performance of the sector.

The table shows that the financial impact on the Sector as a result of moving to BAT Option 2 (the most cost-effective option) is minimal. The main reason for this is that the annualized cost to the sector of $16 million per year is not significant when compared to the size of the entire sector.

Summary of Financial Analyses

The financial analyses concluded that BAT Option 2 is the most cost-effective option for the OCM Sector and will not materially affect the financial position of the plants that are subject to the MISA Regulation.

Table 4-1 Summary of Model BAT and Costs for the OCM Sector

Costs (1991 Dollars)*

* Source – SAIC, "BAT Report for the OCM Sector", 1992 and plant updates.

Plant Site	BAT Option	Best Available Technology	Capital Cost (000's $)	O&M Cost (000's $)
Amoco Canada Ltd.	BAT #1	-	0	0
	BAT #2	GAC, FIL	2,240	892
	BAT #2M	GAC, FIL	2,240	892
	BAT #3	GAC, FIL	2,240	892
BASF Canada (Arnprior)	BAT #1	-	0	0
	BAT #2	-	0	0
	BAT #2M	GAC, FIL	2,398	1,464
	BAT #3	GAC, FIL	2,398	1,464
BASF Canada (Sarnia)	BAT #1	-	0	0
	BAT #2	-	0	0
	BAT #2M	-	0	0
	BAT #3	-	0	0
Celanese Canada Inc.	BAT #1	-	0	0
	BAT #2	-	0	0
	BAT #2M	GAC, FIL	10,005	772
	BAT #3	GAC, FIL	10,005	772
Chinook Canada Ltd.	BAT #1	-	0	0
	BAT #2	BIO	657	74
	BAT #2M	BIO, GAC, FIL	1,550	375
	BAT #3	BIO, GAC, FIL	1,550	375
Cornwall Chemicals Ltd.	BAT #1	SS	1,132	337
	BAT #2	SS	1,132	337
	BAT #2M	SS, GAC, FIL	3,003	1,344
	BAT #3	SS, GAC, FIL	3,003	1,344
Dow Canada Inc.	BAT #1	-	0	0
	BAT #2	GAC,FIL,SS,NEU,CP,API	7,195	2,819
	BAT #2M	GAC,FIL,SS,NEU,CP,API	14,288	7,707
	BAT #3	GAC,FIL,SS,NEU,CP,EVAP,API	178,548	25,007

Table 4-1 Summary of Model BAT and Costs for the OCM Sector

Costs (1991 Dollars)*

* Source – SAIC, "BAT Report for the OCM Sector", 1992 and plant updates.

Plant Site	BAT Option	Best Available Technology	Capital Cost (000's $)	O&M Cost (000's $)
Du Pont (Corunna)	BAT #1	-	0	0
	BAT #2	-	0	0
	BAT #2M	FIL	2,098	134
	BAT #3	FIL	2,098	134
Du Pont (Kingston)	BAT #1	-	0	0
	BAT #2	API, EQUAL, BIO	924	115
	BAT #2M	API, EQUAL, BIO, GAC, FIL	4,206	1,882
	BAT #3	API, EQUAL, BIO, GAC, FIL	4,206	1,882
Du Pont (Maitland)	BAT #1	-	0	0
	BAT #2	CP,SS,CLAR,SLUDGE,GAC,FIL	20,752	2,139
	BAT #2M	CP,SS,CLAR,FIL,SLUDGE,GAC	32,354	3,177
	BAT #3	CP,SS,CLAR,FIL,SLUDGE,GAC	52,428	5,189
Du Pont (Whitby)	BAT #1	-	0	0
	BAT #2	-	0	0
	BAT #2M	-	0	0
	BAT #3	-	0	0
Ethyl Canada	BAT #1	-	0	0
	BAT #2	CP,SS,FIL,SS,EQUAL,BFP,GAC	6,403	1,259
	BAT #2M	CP,SS,FIL,SS,EQUAL,BFP,GAC	6,403	1,259
	BAT #3	EVAP	258,411	29,784
G.E. Plastics Canada	BAT #1	-	0	0
	BAT #2	-	0	0
	BAT #2M	GAC, FIL	7,510	442
	BAT #3	GAC, FIL	7,510	442
GEON Canada Inc. (B.F. Goodrich)	BAT #1	-	0	0
	BAT #2	-	0	0
	BAT #2M	GAC, FIL	8,903	630
	BAT #3	GAC, FIL	8,903	630

Table 4-1 Summary of Model BAT and Costs for the OCM Sector

Costs (1991 Dollars)*

* Source -- SAIC, "BAT Report for the OCM Sector", 1992 and plant updates.

Plant Site	BAT Option	Best Available Technology	Capital Cost (000's $)	O&M Cost (000's $)
Guardsman Products	BAT #1	-	0	0
	BAT #2	-	0	0
	BAT #2M	-	0	0
	BAT #3	-	0	0
Imperial Oil Chemicals Division	BAT #1	-	0	0
	BAT #2	-	0	0
	BAT #2M	-	0	0
	BAT #3	GAC, FIL	32,749	3,449
Morbern	BAT #1	-	0	0
	BAT #2	GAC, FIL	2,556	1,602
	BAT #2M	GAC, FIL	2,556	1,602
	BAT #3	GAC, FIL	2,556	1,602
Novacor Chemicals (Mooretown)	BAT #1	-	0	0
	BAT #2	-	0	0
	BAT #2M	FIL	732	64
	BAT #3	FIL	732	64
Novacor Chemicals (Sarnia)	BAT #1	-	0	0
	BAT #2	-	0	0
	BAT #2M	-	0	0
	BAT #3	-	0	0
Oxychem Durez Canada (CanadianOxy Ltd.)	BAT #1	-	0	0
	BAT #2	GAC, FIL	770	229
	BAT #2M	GAC, FIL	770	229
	BAT #3	GAC, FIL	770	229
Polysar	BAT #1	-	0	0
	BAT #2	CP, SS	5,744	5,077
	BAT #2M	CP, SS, GAC, FIL	57,757	9,622
	BAT #3	CP, SS, GAC, FIL	57,757	9,622

Table 4-1 Summary of Model BAT and Costs for the OCM Sector

Costs (1991 Dollars)*

* Source – SAIC, "BAT Report for the OCM Sector", 1992 and plant updates.

Plant Site	BAT Option	Best Available Technology	Capital Cost (000's $)	O&M Cost (000's $)
Rohm and Haas (Morrisburg)	BAT #1	-	0	0
	BAT #2	GAC, FIL	1,886	1,015
	BAT #2M	GAC, FIL	1,886	1,015
	BAT #3	GAC, FIL	1,886	1,015
Rohm and Haas (West Hill)	BAT #1	-	0	0
	BAT #2	-	0	0
	BAT #2M	-	0	0
	BAT #3	-	0	0
Stepan Canada Inc.	BAT #1	-	0	0
	BAT #2	BTU	11	3
	BAT #2M	BTU, GAC, FIL	8,307	554
	BAT #3	BTU, GAC, FIL	8,307	554
Uniroyal	BAT #1	-	0	0
	BAT #2	GAC, FIL	1,292	559
	BAT #2M	GAC, FIL	1,292	559
	BAT #3	GAC, FIL	1,292	559
OCM Sector - Total Costs Total Plants = 26*	BAT #1	-	1,132	337
	BAT #2	-	51,562	16,120
	BAT #2M	-	168,257	33,722
	BAT #3	-	637,347	85,008
U.S. OCPSF Sector Reg.-Total Costs Total Plants = 654	BPT	SS / CLAR / BIO	215,100	76,600
	BAT #2	End of Pipe BIO or In-Plant Controls	348,100	224,200
	TOTAL	-	563,200	300,800

Table 4-1 Summary of Model BAT and Costs for the OCM Sector

Costs (1991 Dollars)*

* Source -- SAIC, "BAT Report for the OCM Sector", 1992 and plant updates.

Key to Codes used in the Table

O&M Cost	Operation and Maintenance Costs per year
-	Not Required - Current Performance Meets BAT Option Criteria or Contributing Sytream to be Treated
API	American Petroleum Institute Oil Separator
BFP	Belt Filter Press
BIO	Biological Treatment
BTU	Biological Treatment Upgrading
CLAR	Clarification
CP	Chemical Precipitation
EQUAL	Equalization
EVAP	Evaporation
FIL	Filtration
GAC	Granular Activated Carbon
NEU	Neutralization
SLUDGE	Sludge Drawoff and Disposal
SS	Solids Settling
*——	Costs not defined for one plant -- Goodyear Canada Inc. (Bowmanville)

TABLE 4-2

SUMMARY OF TOTAL OCM SECTOR COSTS BY BAT OPTION

BAT Option	Costs (1991 dollars)	
	Capital $ millions	Operating $ millions/yr
Option 1	1.1	0.3
Option 2	51.6	16.1
Option 2M	168.3	33.7
Option 3	637.3	85.0

TABLE 4-3

OCM SECTOR BAT OPTIONS SUMMARY

BAT Options	Costs (000's dollars)			Total Loading Reductions and Cost Per Kilogram Removed		
	Capital	Operating	After Tax Annualized Cost	Loadings (kilograms)	Loadings Reduction (Percent)	Average Cost $ per Kilogram Removed
Initial Loadings				2,980,946		
Option 1	1,132	337	332	2,975,240	5,706 (0.2%)	56.51
Option 2	51,562	16,120	15,147	1,931,727	1,049,219 (35.2%)	14.44
Option 2M	168,257	33,722	38,101	1,615,415	1,365,531 (45.8%)	27.90
Option 3	637,347	85,008	118,685	1,260,759	1,720,187 (57.7%)	69.00

TABLE 4-4

EFFECTS ON FINANCIAL INDICATORS UNDER EACH BAT OPTION 10 YEAR AVERAGE

	RETURN ON SALES (Percent)	**RETURN ON ASSETS (Percent)**	**RETURN ON CAPITAL (Percent)**	**CURRENT RATIO**	**QUICK RATIO**
PRE-ABATEMENT	*5.75*	*9.11*	*10.86*	*1.87*	*1.30*
BAT OPTION:					
1	5.44	8.79	10.37	1.83	1.19
2	5.31	8.58	10.07	1.79	1.18
2M	3.91	7.38	8.02	1.71	1.11
3	3.65	7.29	7.89	1.67	1.09

5.0 EFFLUENT LIMITS

Introduction

In this section information is provided on how the regulatory limits were developed on the basis of the regulatory monitoring results and BAT(EA) performance data for the OCM Sector through joint Industry-Ministry consultation.

The limit setting methodology was similar to that used by the U.S. EPA for setting National Guidelines for the U.S. OCPSF Sector. The complete details of the technical development of the U.S. effluent limitations guidelines for the OCPSF Sector are presented in a two volume development document[14]. The 99th percentile and the 95th percentile values were extracted from the appropriate BAT(EA) databases to provide site specific daily and monthly average loading limits respectively for each OCM Sector plant.

Because of the heterogeneity of the sector, specific limits had to be developed for each effluent at each plant.

Where found parameters were not included for limits, specific reasons are provided for each parameter.

5.1 THE LIMIT SETTING PROCESS

The MISA Issues Resolution Committee Reports

Each step in the limits development process required the application of scientifically sound and defensible procedures and criteria. Through the work of special working groups, called Issue Resolution Committees, over a period of six months from January 1990 to June 1990 with key representatives from industry, Environment Canada, and the Ministry, standard procedures and criteria were established for each of the limit development steps. The Issue Resolution Committee Reports were compiled into one document[15] covering fifteen issues of which the following seven were key to the limit setting process:

- Monitoring Data Analysis
- Quality Assurance and Quality Control
- Best Available Technology
- Economic Achievability
- Limit Setting and Form of Limits
- Selection of Parameters for Limits
- Compliance

The Role of the JTC and Sector Sub-Committees

The limits regulation including the specific limit values were developed through ongoing consultation and discussion with the industry sector and Environment Canada mainly within the DATABAT Sub-committee. The Sub-committee included representatives from industry, Environment Canada and Ministry.

The usual procedure was for the Ministry staff to outline to the Sub-committee members, specific proposals or tasks, discuss any concerns, obtain agreement to proceed and then carry the tasks out. Much of the Ministry work involved the calculation of statistical parameters and effluent performance values.

The product of each task would be brought before the Sub-committee for discussion and approval before the next step was discussed and carried out. Through this consensus building process, the draft OCM Sector Regulation was developed. The final approval and sign-off of the Limits Regulation rested with the OCM Sector Joint Technical Committee.

5.2 FORM OF LIMITS

The Effect of Sector Diversity

Although desirable for its simplicity, a single loading limit for a given parameter for all of the plants in the Sector did not appear to be practical because of the wide diversity of plant operations. Each of the twenty-six plants is unique in terms of size, process chemistry, products, engineering, water use and wastewater characteristics. No two plants have the same treatment configuration or the same wastewater flows.

A single loading limit for each of the parameters found in Sector effluents for all plants based on the performance of the highest dischargers could be set but it would be environmentally unacceptable. Uniform concentration standards if based on the worst case performance could provide a "free ride" to the better performing plants. Concentration standards based on the best performance would likely be unachievable by the larger dischargers without significant additional cost.

The approach which was adopted was to treat each plant as a unique operation and to specify limits on the basis of the performance of technologies specified by the SAIC BAT Consultant as being the best fit for the given plant under each of the four BAT Options. This approach would result in the most stringent set of limits for each Sector plant.

The U.S. EPA approach for the U.S. Organic Sector, primarily because of the large number of plants, was to develop only two sets of BAT concentration based limits to cover all plants under one of two sub-categories:

- plants with end-of-pipe biological treatment
- plants with no end-of-pipe biological treatment.

Individual plant flows were then used in conjunction with the appropriate category limits to derive loading limits for each plant.

The result has been that U.S. limits are less stringent, especially for plants falling into the second category, than could be developed under the MISA approach of setting specific limits for each plant. Section 5.5 provides a comparison of the U.S. EPA limits with those of the OCM Sector.

For BAT Option 2 the SAIC Consultant specified the technology base used by the U.S. EPA to develop limits for the U.S. Organic Chemicals Sector namely:

- end-of-pipe biological treatment
- end-of-pipe carbon treatment
- physical/chemical treatment

The more stringent BAT Option 2M was based on a technology train combination of two or more of the BAT Option 2 technologies. BAT Option 3 was identical to BAT Option 2M except for the addition of vapour compression distillation in some selective cases.

Where plant discharges of found parameters were lower than would be expected with the application of BAT technologies or where BAT performance data for the found parameters were not available, limits were set equal to the plant's current performance. The rationale for this approach was based on equating the current performance with in-plant pollution control and best management practices (BMPs).

For plants with multiple process effluents, limits were set on each individual discharge and then summed to arrive at the regulatory plant limit shown in the regulation. A single plant limit for a parameter rather than individual pipe limits was adopted for the Regulation.

The Effect of Production and Flow

The three options for the type of limits were put forth in the Issues Resolution Process Final Report[4] as:

- production-based loading limits
- loading-based limits
- concentration-based limits

OCM Sector plants differ significantly with respect to their products production levels, and water usage. Even at a single plant, the many products made and the accompanying variation in water usage make it virtually impossible to correlate effluent contaminant loading with production. Therefore, production-based loading limits for the Sector were rejected.

Of the remaining two options, loading based limits are superior to concentration limits in that they preclude the use of dilution for compliance as might occur with concentration based limits and they tend to encourage water conservation practices. The OCM Sector limits were developed on the basis of loadings.

Time Basis and Compliance Monitoring Frequency

Traditionally limits have been imposed as daily values based on twenty-four hour sampling periods and as monthly average of daily values. Daily limits must reflect short-term fluctuations in processes and effluent treatment. The monthly average limits represent the longer term control and are more stringent than the daily values.

The decision on the frequency of compliance monitoring is a trade-off between the cost of sampling and analysis and the need for assurance that the limits are being met. For the limits regulation, daily, weekly and quarterly compliance monitoring frequencies were set with appropriate rationale to allow the limited parameters at each plant to the assigned to one of the three frequency groups for compliance monitoring.

As a result of discussions in the Joint Technical Committee and recognizing the ongoing costs of monitoring, the Ministry is allowing a reduction in monitoring from daily to thrice-weekly provided the plant meets the "good performance" criteria required by the Regulation.

The reduction in frequency allowance is based on the rationale that where there is good control of effluent levels and variability, fewer samples may be taken without compromising the need to ensure that dischargers are meeting the limits.

Effluent Stream Types

The MISA OCM Sector discharge limits apply to process effluents only since they contribute virtually all of the loadings from the Sector plants into Ontario's waterways.

There are no loading limits imposed on once-through non-contact cooling water streams. Instead , these streams will require regular monitoring for assessment. The results of the assessment monitoring can be used, if necessary, to develop control programs to ensure that the cooling water is contaminant free.

Monitoring requirements for non-contact cooling water effluent streams are included in the Regulation so that any leaks from process heat transfer equipment can be detected.

A basic list of assessment parameters was established for all plants with non-contact cooling water effluent streams. Additional site-specific parameters were added where warranted by operations. Site-specific cooling water schedules, listing the parameters to be monitored have been provided for each plant with cooling water effluents.

The basic list consists of the following four assessment parameters:

- pH
- DOC
- Specific Conductance
- TSS

No limits are imposed on storm water at this time due largely to the limited data that was obtained during the regulatory monitoring period. Instead, plants with storm water discharges will be required, under the Regulation, to carry out storm water control studies providing, where appropriate, recommendations for control of storm water discharges.

The Ministry may require that the recommendations be implemented by the plants at some future date. The storm water control studies are to be carried out in accordance with the requirements stated in the Ministry Storm Water Protocol[18].

5.3 SELECTION OF PARAMETERS FOR LIMITS

Background

The selection of parameters for limits was a multi-step process which was intended to ensure that the final limits list:

- reflected the contaminants found at the site (through a review of monitoring data and QA/QC data)
- accounted for any contaminants of special concern to the Ministry (such as the candidates for bans or phase outs)
- reflected parameters that could be controlled by the designated BAT including pollution prevention principles of chemical substitution, water conservation, waste reduction at source, recycling/reuse and manufacturing process operational changes
- through the use of surrogate parameters where possible, struck an economic balance between the Ministry's need for assurance of on-going compliance with the limits through plant self-auditing and the cost of monitoring for an extensive list of limits parameters without compromising the quality of the limits regulation.

The Found Parameter List

The starting point for the development of the final list of parameters for limits was the found parameter list. All of the parameters found[•] at each sampling point at a plant during the twelve-month regulatory monitoring period were placed on the found list for that sampling point.

Table 5-1 shows the parameters that were monitored by the Sector together with those that were found. The found parameters are broken down by individual sampling points for each plant in Table A-1 of Appendix A.

[•] found – a parameter was listed as found unless a statistical proportion of 0.9 of the concentration data results (at a 95% confidence level) was less than the Regulation Method Detection Limit (RMDL) – referred to as the 90/10 Edit Rule.

The individual sampling points listed in Table A-1 are identical to the lists shown in Appendix E of the Twelve-Month Monitoring Data Report[9]. The parameter pH was not included in the overall and individual plant listings because it is being regulated in a range of 6.0-9.5 for all final discharges for all plants.

Table 5-1 shows the one hundred and fifty-five parameters that were specified for regulatory monitoring and the one hundred and fifteen parameters that were found in one or more of the Sector effluents.

The Candidate List for Limits

Parameter Rejection Criteria

To develop the candidate list of parameters for limits, the monitoring data for each of the found parameters shown for a given sampling point was reviewed. The lists used for this assessment are the found lists shown in Table A-1 in Appendix A.

The review of the found list was required to identify and remove any parameters which were not valid candidates for limits.

A parameter could only be rejected from the candidate list for limits on the basis of the following reasons:

- the parameter was present in the intake water at comparable concentration levels to those in the effluent and was therefore a pass-through parameter
- analytical data were insufficient to establish presence/absence or to calculate performance
- analytical data were unreliable due to laboratory problems
- analytical data were unreliable due to field Quality Assurance/Quality Control (QA/QC) problems
- the parameter was demonstrated to be no longer discharged because of process changes or shutdowns.

Table A-1 in Appendix A, shows specific reasons for each parameter which did not qualify for the candidate list of parameters for limits for each plant.

An additional four parameters were removed from limits consideration on a sector-wide basis:

- Chemical Oxygen Demand (COD)
- Total Organic Carbon (TOC)
- Specific Conductance
- Volatile Suspended Solids (VSS)

The basic rationale for not limiting the four parameters is provided as follows:

Chemical Oxygen Demand (COD)

COD is a broad measure of both organic and inorganic materials that can be oxidized. It was rejected as a limits parameter because:

- only two to four data points per plant were available from the monitoring period thus making it impossible to establish performance values
- Dissolved Organic Carbon (DOC) is available as a surrogate to provide control over the same type of organic contaminants as would be measured under COD
- individual metal limits would provide control over the inorganic contaminants that would be measured under COD
- COD cannot discriminate among metals or among organic contaminants to make it useful for correlating results with specific treatment technology operation
- COD has a relatively high RMDL of 10 mg/L.

Total Organic Carbon (TOC)

TOC is a measure of total organic carbon in a sample -- in solution and in solid form. It was rejected as a limits parameter because:

- Dissolved Organic Carbon (DOC) is available as a surrogate at a significantly lower RMDL of 0.5 mg/L (versus 5.0 mg/L for TOC) which allows improved detection of organic compounds in plant discharges
- any solid form of carbon which may not be measured by DOC, would be controlled through the measurement of Total Suspended Solids (TSS).

Specific Conductance

Specific Conductance is a crude measure of the amount of dissolved salts in an aqueous sample.

It was rejected as a limits parameter because:

- it does not distinguish dissolved salts of relatively innocuous cations of sodium, calcium and magnesium from heavy metal salt cations such as mercury, lead, copper, nickel and zinc and therefore is not sufficiently selective
- values of specific conductance vary widely even for pristine water bodies depending on the minerals content

- the BAT to control dissolved salts is based on either membrane or vapour compression technology -- both are not economically achievable for the Sector

Volatile Suspended Solids (VSS)

Volatile suspended solids are measured as filtered solids from an aqueous sample by difference between Total Suspended Solids (filtration and drying at 103°C for 30 minutes) and the residue remaining after ignition at 550°C for four hours or to constant residue weight.

VSS was rejected as a limits parameter because:

- Total Suspended Solids (TSS), which includes VSS, is available as a surrogate for control of VSS and at a lower RMDL of 5 mg/L (versus 10.0 mg/L for VSS)

- TSS is a quicker and a less costly test for suspended solids.

The parameters making up the candidate list for limits for the Sector as a whole are shown in Table 5-1 under the "Limited" Column. In the same table, notes are provided stating the reasons for not placing some found parameters on the Limited Parameter List

Based on the rejection criteria the following 22 parameters were dropped in deriving the candidate list for limits from the found list:

- COD
- TOC
- Sp Conductance
- VSS
- cadmium
- thallium
- 1,1,2,2-tetrachloroethane
- 1,1-dichloroethylene
- 1,3-dichlorobenzene
- bromodichloromethane
- cis-1,3-dichloropropylene
- trans-1,2-dichlorethylene
- trans-1,3-dichloropropylene
- trichlorfluoromethane
- acrolein
- 2,6-dinitrotoluene
- 2-chloronaphthalene
- benzylbutylphthalate
- di-n-octylphthalate
- 1,2,3,4-tetrachlorobenzene
- 1,2,3,5-tetrachlorobenzene
- hexachlorocyclopentadiene

Individual plant site candidate lists for limits are shown in Table A-1, Appendix A.

The Final List

Once the candidate list of parameters for limits was established for each sampling point at each plant through the editing process described previously, it was reviewed to determine if BAT performance data was available for each parameter and if surrogate parameters could be used to reduce the proposed number of parameters for limits.

Where for a parameter on the final list, specific BAT performance data for end-of-pipe or in-plant control was not available, the current plant performance was used as the basis for limits.

In addition, where current plant discharges for a given parameter were lower than predicted on the basis of end-of-pipe or in-plant BAT treatment, the current performance data was used for setting a limit for that parameter. Therefore no parameter was deleted because of the lack of BAT performance data.

The final list of parameters for limits is shown in Table 5-1 for the whole sector or by individual plants in Appendix B.

Surrogate Parameter Selection

Surrogate parameters are ones which can be used as substitutes for other parameters or groups of parameters to predict limit compliance for the larger group. Typically, surrogates are selected on the basis of their similarity of structure, physical and chemical properties, environmental fate and response to BAT treatment to other compounds.

Typically, a limit set on one or two of the highest effluent concentration parameters, which have been selected as surrogates for a larger group of discharged contaminants, can be sufficient to provide assurance that all of the contaminants are being controlled without the added financial burden of analysing all of the like-contaminants.

Parameters at each plant, deleted from limits because of available surrogates are shown with an "S" symbol in Table A-1, Appendix A.

Monitoring Frequency Assignment

The IRC process set the basic frequencies for compliance monitoring under the limits regulation as daily, weekly and quarterly. Limits to be met would consist of daily maximum and monthly average values.

Monthly limits would be based on either weekly data averages if a parameter was monitored weekly or on 30-31 data point averages if a parameter was monitored daily.

The assignment of a compliance monitoring frequency to the candidate parameters chosen for limits was based on the general selection rules which were applied to all plants in the sector.

The following is a list of key criteria under each frequency that would qualify a parameter for that frequency of monitoring:

Parameter Criteria for Daily Monitoring

- key parameters to measure treatment performance
- key spill indicators
- broad generic parameters -- primarily conventionals
- common to all plants in the sector
- rapid and cost effective analysis
- required under C of As, control orders
- key parameters to measure overall plant performance
- special parameters of major concern

Parameter Criteria for Weekly Monitoring

- specific parameters uniquely indicative of plant processes
- secondary conventional parameters -- indicators of treatment performance
- surrogate parameters
- required by the federal government for information purposes

Parameter Criteria for Quarterly Monitoring

- parameters to verify surrogate relationships
- special EMPPL -- PCDDs/PCDFs
- candidate parameters for Bans or Phase Outs
- parameters not found but of special concern based on raw material usage

Despite the general criteria, in many cases Best Professional Judgement (BPJ) was used to assign the appropriate frequencies for some parameters. In general, the same monitoring frequency was maintained for a given parameter for all of the plants at which it was being limited.

In cases of multiple effluent pipes at a plant, the individual pipe assigned frequency of monitoring for a given common parameter had to be harmonized to ensure a common plant frequency. Otherwise a meaningful plant limit for the parameter could not be set. In all cases, the most stringent frequency for any of the multiple effluents was adopted as a common frequency for the parameter for all of the effluents at the plant.

Appendix B shows the assigned compliance frequencies for each parameter on the candidate list for limits for each plant.

5.4 STATISTICAL DERIVATION OF LIMITS

Calculation of Monitoring Period Performance Values

The statistical methodology used to calculate effluent performance values and to perform variability analyses is outlined in the Issues Resolution Process, Issue Resolution Committee Reports document[4A].

The following performance variables were calculated using the SAS 6.06 statistical software package for each parameter on the found list where sufficient monitoring data were available:

Concentration

- CLTA - concentration -long term average based on 12 months of monitoring

- CVF1 - concentration-daily variability factor

  $CVF1 = \frac{P99}{E(x)}$ where P99 = the 99th percentile value from the best fit probability distribution

  $E(x)$ = expected arithmetic means of the distribution

- CVF4; CVF30 - concentration-monthly average variability factors based on 4 and 30 day samples, respectively

  $CVF4 = \frac{P95}{E(x_4)}$ where P95 = the 95th percentile value of 4 day means

  $E(x_4)$ = expected mean of the 4 day averages

  $CVF30 = \frac{P95}{E(x_{30})}$ where P95 = the 95th percentile value of 30 day means

  $E(x_{30})$ = expected means of 30 day averages

With the variability factors and long term averages available, daily and monthly current performance values were calculated as follows:

- daily concentration maximum (DC) - 99th percentile
  $DC = CLTA \times CVF1$

- monthly average concentration (4 or 30 point) -- 95th percentile
  $MC4 = CLTA \times CVF4$; $MC30 = CLTA \times CVF30$

- long term average flow (FLTA) -- based on averaging daily data over 12 months of monitoring.

Loading

Loading values were calculated in a manner similar to that for the concentration data. Daily loadings were calculated for each 24 hour period as a product of daily concentration and corresponding daily flow.

The statistical methodology paralleled the calculation of concentration performance values. The following performance data based on loadings was calculated for each found parameter:

- LLTA - loading-term average based on 12 months of monitoring
- LVF1; LVF4; LVF30 - daily, 4 and 30 point average loading variability factors respectively
- daily loading maximum (DL) -- 99th percentile

  DL = LLTA x LVF1

- monthly average loading - (4 or 30 point) - 95th percentile

  M4L = LLTA x LVF4
  M30L = LLLTA x LVF30

Calculation Of BAT Performance Values And Limits

The Ministry provided to the SAIC consultant the results of the twelve months of monitoring in terms of long term concentration and long term average loadings for each found parameter. The SAIC consultant through his search of BAT provided in the BAT report[11] the long term concentration values that could be achieved based on the operation of the designated model technology for each plant under each of the three BAT options.

Where the SAIC consultant was able to only provide the long term average concentration value for a parameter for a given BAT, the corresponding long term average BAT loading was calculated as the product of the long term average concentration obtained for the BAT technology and the twelve month average flow of the OCM Sector plant effluent stream, as measured under the regulatory monitoring phase of the MISA program.

Where the twelve-month regulatory period monitoring data for a found parameter at a plant was lower than predicted by the SAIC consultant on the basis of end-of-pipe or in-plant treatment, the regulatory data was used to set the discharge limits for the parameter at the plant.

For found parameters where no BAT performance data was provided by the SAIC consultant, the twelve month regulatory monitoring data was retained as BAT performance.

Once the long term BAT performance loading values were calculated, the daily maximum loading limits and the monthly average loading limits were calculated using the statistically derived daily P99 and monthly P95 variability factors from the analysis of plant performance data from the regulatory monitoring period.

Specifically the limits were calculated as follows:

BDL = LLTA x LVF1
BML = LLTA x LVF4 or LLTA x LVF30

where BDL = daily maximum loading limit (99th percentile)
BML = monthly average loading limit (95th percentile)
BML4 = monthly 4 point average loading limit (95th percentile)
BML30 = monthly 30 point average loading limit (95th percentile)
LVF1,LVF4 and LVF30 variability factors specific to each plant

The 1989-90 monitoring period and the predicted BAT performance values for each parameter on the final list for limits for each plant are shown in Appendix B.

Implications of the Limits Calculations

Variability Factors

Variability factors when used in conjunction with long term average data to calculate daily or monthly performance provide an allowance for short term daily or longer term monthly average fluctuations from the long term performance. Variability factors are necessary to reflect variability from sources such as:

- sampling
- analysis
- flow measurement
- process fluctuations
- treatment fluctuations.

In calculating limits for each sector plant, where variability data for a proposed BAT were not available, the variability factors reflecting the plant operation during the monitoring period, were retained for calculation of loading limits. However, any variability factors above 10 were reduced to 10.

Where significant new treatment technology was proposed for a plant, and where variability data were available for the technology, the technology related variability factors were used to calculate limits.

Compliance With The Limits

Because the limits have been derived on the basis of the 99th percentile for daily maximum loadings and the 95th percentile for monthly average loadings, there is an implied 50% probability that even a well operated model BAT plant may have an expectation of one exceedance in every one hundred daily measurements and five exceedances in every one hundred monthly average values. This may amount to three or four exceedances per year for each daily monitored parameter under limits and one exceedance in every 20 months for each parameter with a monthly limit.

To increase the potential for avoiding the predicted statistical exceedances, additional effort to better control discharges through equipment improvements or more efficient operation will be required on the part of the plants.

Current Ministry Control Documents

One of the goals of the MISA Initiative was to replace the various Ministry legal documents that are now in place with their differing requirements for the control of aqueous discharges with one set of uniform limits under the MISA limits regulation. To this end, all of the Ministry legal documents with respect to aqueous discharges were reviewed.

Where a comparison of common parameters could be made, it was found that Certificate of Approval TSS concentration limits at three plants were marginally lower than the TSS concentration equivalents to the loading limits proposed under the Limits Regulation.

A Certificate of Approval TOC concentration limit at a fourth plant was also marginally lower than the DOC concentration equivalent to the loading limit proposed under the Limits Regulation.

It was concluded that the Limits Regulation covered more parameters at each plant and required lower discharge levels for almost all comparable parameters than currently specified in the Ministry's legal documents controlling aqueous discharges.

Candidate Substances for Bans or Phase-Outs

In April 1992 and October 1993, the Ministry published two reports[15,15a] which listed twenty-one candidate chemicals to be considered for multimedia banning, phasing out or for use/release reductions.

These chemicals are persistent and bioaccumulative, and therefore special care was taken to ensure that they were included for limits at the plants where they were found.

Of the twenty-one parameters listed, seven were found in the Sector effluents. Table 5-2 lists the seven and the plants where they were found.

Polychlorinated Dibenzodioxins and Dibenzofurans (PCDDs/PCDFs)

This special group of compounds on the Ministry bans or phase outs list is defined in the regulation under the generic term of "specific parameters". Levels of PCDDs/PCDFs in plant discharges must be non-measurable which is defined in the regulation as follows:

• 2,3,7,8-tetrachlordibenzo-p-dioxin concentration	< 20 picograms/L
• 2,3,7,8-tetrachlorodibezofuran concentration	< 50 picograms/L
• total toxic equivalent concentration (TEQ) of all 2,3,7,8-substituted dioxin and furan congeners	≤ 60 picograms/L

The method of calculating a TEQ value from the analysis of seventeen 2,3,7,8-substituted dioxin and furan congeners is outlined in the Ministry sampling and analytical protocol[17].

While all plants under the regulation are subject to the non-measurable limits for the "specific parameters", quarterly self-monitoring for PCDDs/PCDFs is required only at those plants where past Ministry and plant data has indicated the presence of these compounds in the plant effluents.

BAT Performance Values Near RMDL

No loading limits were set on the basis of concentration values lower than four times the Regulation Method Detection Limit (RMDL) for daily maxima or two times RMDL for monthly averages. This was done to ensure that the concentration values were sufficiently above the minimum analytical detection level to be quantifiable and thus legally defensible.

An analytical result at the RMDL level has an associated maximum of 2 x RMDL at a 99% confidence level but concurrently a minimum of zero. Therefore, a result at RMDL is indeterminate for the purposes of limit enforcement and therefore limits set at an RMDL level cannot be enforced if ongoing individual samples also produce values around the RMDL level.

A result at RMDL may provide a positive detection but it is not quantitative since statistically the concentration of the substance can be somewhere between zero and 2 x RMDL. The percent error of the value at 4xRMDL is narrowed to ± 25% at a 99% confidence level. At an RMDL limit value, the analytical uncertainty is ± 100% at a 99% confidence level.

Final Limits

The tables in Appendix B show the limits which were finally adopted for each sampling point at each plant. Because the loading limits in the Regulation are specified as plant limits, the individual sampling point data, shown in Appendix B, must be summed over all of the sampling points at a given site for a comparison to be made with the numbers in the regulation.

The tables in Appendix B also show the concentration equivalents to the daily and monthly average loading limits. The concentration data allow for a more meaningful comparison of the BAT performance among plants differing widely in flows.

The final daily and monthly average plant loading limits in the regulation have been rounded-off to two significant digits in keeping with the general accuracy of the data used to generate the numbers.

5.5 LIMITS IN OTHER JURISDICTIONS

The U.S. EPA released its regulation for the Organic Chemicals, Plastics, and Synthetic Fibres (OCPSF) Sector, the U.S. equivalent to the OCM Sector, in the Federal Register[16] on November 5, 1987. Approximately 940 facilities were covered within the scope of the regulation.

The regulation consists of national guidelines in terms of concentrations. The actual National Pollution Discharge Elimination System (NPDES) permit limits are based on the national guidelines and local plant flows calculated specifically for each regulated plant by local EPA or State NPDES permit writers. Mass limits in pounds/day are specified as daily maximum and daily average values.

All of the regulated parameters are to be monitored at least annually while monitoring a shorter list of those parameters expected to be discharged from a given facility is set out in each NPDES permit at more frequent monitoring, i.e. daily, weekly, monthly depending on local conditions.

The U.S. Regulation sets out seven sub-categories for limits for BOD_5, TSS and pH. It sets out only two sub-categories for BAT -- end-of-pipe biological treatment with sixty-three pollutants limited and non-end-of-pipe biological treatment with fifty-nine pollutants limited.

Plants are to come into compliance with the new regulations as their current NPDES permits expire.

Typical current NPDES permits require annual monitoring for all regulated parameters which are those not associated with the product-processes employed or not expected to be present in the effluent at levels significantly in excess of the minimum quantification level (MQL). MQL is defined as 3.3 times the analytical method detection limit (MDL).

Mass limits in the form of daily maximum and daily average values are set out for priority pollutants associated with operations. These limited parameters are generally monitored at thrice weekly or monthly frequencies. In addition, conventional pollutants measured by BOD_5 or TSS are also limited and typically monitored twice weekly. Limits for pH are specified as a range of 6.0 to 9.0.

Typically, acute lethality testing is required twice per year using two species - Daphnia pulex and fathead minnows (Pimephales promelas). Annual chronic toxicity testing is also being specified using Ceriodaphnia dubia and fathead minnows.

The U.S. EPA, BPT and BAT OCPSF limits are shown in Table 5-3. Full details of the development of the U.S. OCPSF Sector Regulation is provided in the U.S. EPA Development Document[14].

5.6 MAJOR SECTOR CONCERNS AND THEIR RESOLUTION

The Joint Technical Committee discussion process, over the period of 1992-94 was successful in developing the basis for the Sector Effluent Limits Regulation.

However, in the final stages of the regulation development process, the industry group identified three major concerns that required further discussion and resolution if a consensus was to be reached on the Regulation.

The first issue arose because under the agreed upon limit setting process, there is a potential for occasional exceedances of the proposed limits to occur for even well operated BAT plants.

The use of the 99th and 95th percentile BAT plant performance values for setting daily and monthly average limits implies that there is a statistical probability of one value in one hundred daily readings and five values in one hundred monthly averages (one every twenty months) being above the regulation limit. Industry expressed concern about potential Ministry enforcement action and the negative public perception that these exceedances might bring about.

The Ministry was able to demonstrate that its compliance policy manual covered such cases under its "Principles of Enforcement" and "Informed Judgement" sections and therefore any statistical exceedances would be recognized as such.

The second issue addressed the location of the acute lethality sampling points. Industry favoured lethality limits at the point of final dischatge to the environment while the Ministry was seeking to place lethality limits at upstream points at the discharges of the BAT treatment units.

The issue was resolved by placing the acute lethality compliance requirement at all final discharges but also requiring assessment monitoring for acute lethality at the upstream BAT treatment locations. If the assessment monitoring indicates acute lethality, the plant is required by the Regulation to provide a toxicity elimination report detailing methods, costs and a timetable for removing the toxic contaminants.

Finally, industry was seeking some relief from the monitoring costs for plants with good performance.

The Ministry agreed to allow plants to reduce daily monitoring to thrice-weekly after one year of monitoring provided the "good performance" criteria outlined in the Regulation were met. It was felt that well operated plants meeting the "good performance" criteria would have effluents with low variability and therefore the Ministry was confident that compliance with the limits could be demonstrated on the basis of three results per week rather than seven.

5.7 ENVIRONMENTAL BENEFITS

The implementation of the MISA limits regulation for the OCM Sector is expected to provide significant reductions of discharges of toxic contaminants into Ontario's waterways.

Based on the results from the regulatory monitoring period, the estimated aqueous discharges of 2,754 tonnes per year of conventional contaminants and 227 tonnes per year of EMPPL contaminants will be reduced by at least 34 and 47 percent, respectively under the limits regulation.

The anticipated reductions in tonnes per year are shown in Table 5-4.

Final discharges will also be non acutely lethal and a significant database will be developed to determine if there are any long term chronic effects, resulting from the discharge of contaminants under the limits regulation. Additional, but at present, unquantifiable benefits will accrue from reduced emissions into the air.

At plants where no additional treatment technology is required to meet the limits, the very existence of legal limits will have the effect of moving the plants to more diligent operations.

Table 5-1
Status of Parameters - Monitored, Found and Limited

ATG	PARAMETER	RMDL	UNIT	Monitored	Found	Limited	Notes
1	COD	10.0	mg/L	●	●		1
2	Cyanide Total	0.005	mg/L	●	●	●	
3	Hydrogen ion (pH)			●	●	●	
4	Ammonia plus Ammonium	0.25	mg/L	●	●	●	
4	Nitrate+Nitrite	0.25	mg/L	●	●	●	
4	Total Kjeldahl nitrogen	0.5	mg/L	●	●	●	
5	DOC	0.5	mg/L	●	●	●	
5	TOC	5.0	mg/L	●	●		2
6	Total phosphorus	0.1	mg/L	●	●	●	
7	Specific conductance	500	uS/cm	●	●		3
8	Total suspended solids	5.0	mg/L	●	●	●	
8	VSS	10.0	mg/L	●	●		4
9	Aluminum	30.0	ug/L	●	●	●	
9	Beryllium	10.0	ug/L	●			
9	Boron	50.0	ug/L	●	●	●	
9	Cadmium	2.0	ug/L	●	●		5
9	Chromium	20.0	ug/L	●	●	●	
9	Cobalt	20.0	ug/L	●	●	●	
9	Copper	10.0	ug/L	●	●	●	
9	Lead	30.0	ug/L	●	●	●	
9	Molybdenum	20.0	ug/L	●	●	●	
9	Nickel	20.0	ug/L	●	●	●	
9	Silver	30.0	ug/L	●			
9	Thallium	30.0	ug/L	●	●		6
9	Vanadium	30.0	ug/L	●	●	●	
9	Zinc	10.0	ug/L	●	●	●	
10	Antimony	5.0	ug/L	●	●	●	
10	Arsenic	5.0	ug/L	●	●	●	
10	Selenium	5.0	ug/L	●			
11	Chromium (hexavalent)	10.0	ug/L	●	●	●	
12	Mercury	0.1	ug/L	●	●	●	
13	Tetra-alkyl lead (Total)	2.0	ug/L	●	●	●	
13	Tri-alkyl lead (Total)	2.0	ug/L	●	●	●	
14	Phenolics (4AAP)	2.0	ug/L	●	●	●	

Table 5-1
Status of Parameters - Monitored, Found and Limited

ATG	PARAMETER	RMDL	UNIT	Monitored	Found	Limited	Notes
15	Sulphide	20.0	ug/L	●	●	●	
16	1,1,2,2-Tetrachloroethane	4.3	ug/L	●	●		7
16	1,1,2-Trichloroethane	0.6	ug/L	●	●	●	
16	1,1-Dichloroethane	0.8	ug/L	●	●	●	
16	1,1-Dichloroethylene	2.8	ug/L	●	●		8
16	1,2-Dichlorobenzene	1.4	ug/L	●	●	●	
16	1,2-Dichloroethane	0.8	ug/L	●	●	●	
16	1,2-Dichloropropane	0.9	ug/L	●	●	●	
16	1,3-Dichlorobenzene	1.1	ug/L	●	●		9
16	1,4-Dichlorobenzene	1.7	ug/L	●	●	●	
16	Bromodichloromethane	0.8	ug/L	●	●		10
16	Bromoform	3.7	ug/L	●	●	●	
16	Bromomethane	3.7	ug/L	●	●	●	
16	Carbon tetrachloride	1.3	ug/L	●	●	●	
16	Chlorobenzene	0.7	ug/L	●	●		11
16	Chloroform	0.7	ug/L	●	●	●	
16	Chloromethane	3.7	ug/L	●	●	●	
16	Cis-1,3-Dichloropropylene	1.4	ug/L	●	●		12
16	Dibromochloromethane	1.1	ug/L	●	●	●	
16	Ethylene dibromide	1.0	ug/L	●	●	●	
16	Methylene chloride	1.3	ug/L	●	●	●	
16	Tetrachloroethylene	1.1	ug/L	●	●	●	
16	Trans-1,2-Dichloroethylene	1.4	ug/L	●	●		13
16	Trans-1,3-Dichloropropylene	1.4	ug/L	●	●		14
16	Trichloroethylene	1.9	ug/L	●	●	●	
16	Trichlorofluoromethane	1.0	ug/L	●	●		15
16	Vinyl chloride	4.0	ug/L	●	●	●	
17	Benzene	0.5	ug/L	●	●	●	
17	Ethylbenzene	0.6	ug/L	●	●	●	
17	Styrene	0.5	ug/L	●	●	●	
17	Toluene	0.5	ug/L	●	●	●	
17	m-Xylene and p-Xylene	1.1	ug/L	●	●	●	
17	o-Xylene	0.5	ug/L	●	●	●	
18	Acrolein	4.0	ug/L	●	●		16

Table 5-1
Status of Parameters - Monitored, Found and Limited

ATG	PARAMETER	RMDL	UNIT	Monitored	Found	Limited	Notes
18	Acrylonitrile	4.2	ug/L	●	●	●	
19	1-Chloronaphthalene	2.5	ug/L	●			
19	1-Methylnaphthalene	3.2	ug/L	●	●	●	
19	2,4-Dinitrotoluene	0.8	ug/L	●			
19	2,6-Dinitrotoluene	0.7	ug/L	●	●		17
19	2-Chloronaphthalene	1.8	ug/L	●	●		18
19	2-Methylnaphthalene	2.2	ug/L	●	●	●	
19	4-Bromophenyl phenyl ether	0.3	ug/L	●			
19	4-Chlorophenyl phenyl ether	0.9	ug/L	●			
19	5-nitro, Acenaphthene	4.3	ug/L	●			
19	Acenaphthene	1.3	ug/L	●	●	●	
19	Acenaphthylene	1.4	ug/L	●			
19	Anthracene	1.2	ug/L	●			
19	Benz(a)anthracene	0.5	ug/L	●			
19	Benzo(a)pyrene	0.6	ug/L	●			
19	Benzo(b)fluoranthene	0.7	ug/L	●			
19	Benzo(g,h,i)perylene	0.7	ug/L	●			
19	Benzo(k)fluoranthene	0.7	ug/L	●			
19	Benzylbutylphthalate	0.6	ug/L	●	●		19
19	Biphenyl	0.6	ug/L	●	●	●	
19	Bis(2-chloroethoxy)methane	3.5	ug/L	●			
19	Bis(2-chloroethyl)ether	4.4	ug/L	●	●		20
19	Bis(2-chloroisopropyl)ether	2.2	ug/L	●	●	●	
19	Bis(2-ethylhexyl) phthalate	2.2	ug/L	●	●		21
19	Camphene	3.5	ug/L	●			
19	Chrysene	0.3	ug/L	●			
19	Di-n-butyl phthalate	3.8	ug/L	●	●		22
19	Di-n-octyl phthalate	2.0	ug/L	●	●		23
19	Dibenz(a,h)anthracene	1.3	ug/L	●			
19	Diphenyl ether	0.4	ug/L	●	●	●	
19	Diphenylamine	14.0	ug/L	●			
19	Fluoranthene	0.4	ug/L	●	●		24
19	Fluorene	1.7	ug/L	●	●	●	
19	Indeno(1,2,3-cd)pyrene	1.3	ug/L	●			

Table 5-1
Status of Parameters - Monitored, Found and Limited

ATG	PARAMETER	RMDL	UNIT	Monitored	Found	Limited	Notes
19	Indole	1.9	ug/L	●	●	●	
19	N-Nitrosodi-n-propylamine	3.1	ug/L	●	●		25
19	N-Nitrosodiphenylamine	14.0	ug/L	●			
19	Naphthalene	1.6	ug/L	●	●	●	
19	Perylene	1.5	ug/L	●			
19	Phenanthrene	0.4	ug/L	●	●	●	
19	Pyrene	0.4	ug/L	●			
20	2,3,4,5-Tetrachlorophenol	0.4	ug/L	●	●		26
20	2,3,4,6-Tetrachlorophenol	2.8	ug/L	●			
20	2,3,4-Trichlorophenol	0.6	ug/L	●	●		27
20	2,3,5,6-Tetrachlorophenol	1.6	ug/L	●			
20	2,3,5-Trichlorophenol	1.3	ug/L	●			
20	2,4,5-Trichlorophenol	1.3	ug/L	●			
20	2,4,6-Trichlorophenol	1.3	ug/L	●			
20	2,4-Dichlorophenol	1.7	ug/L	●			
20	2,4-Dimethylphenol	7.3	ug/L	●			
20	2,4-Dinitrophenol	42.0	ug/L	●			
20	2,6-Dichlorophenol	2.0	ug/L	●			
20	2-Chlorophenol	3.7	ug/L	●			
20	4,6-Dinitro-o-cresol	24.0	ug/L	●			
20	4-Chloro-3-methylphenol	1.5	ug/L	●			
20	4-Nitrophenol	1.4	ug/L	●			
20	Pentachlorophenol	1.3	ug/L	●			
20	Phenol	2.4	ug/L	●	●		28
20	m-Cresol	3.4	ug/L	●	●	●	
20	o-Cresol	3.7	ug/L	●	●	●	
20	p-Cresol	3.5	ug/L	●	●	●	
23	1,2,3,4-Tetrachlorobenzene	10.0	ng/L	●	●		29
23	1,2,3,5-Tetrachlorobenzene	10.0	ng/L	●	●		30
23	1,2,3-Trichlorobenzene	10.0	ng/L	●	●	●	
23	1,2,4,5-Tetrachlorobenzene	10.0	ng/L	●	●	●	
23	1,2,4-Trichlorobenzene	10.0	ng/L	●	●	●	
23	2,4,5-Trichlorotoluene	10.0	ng/L	●	●	●	
23	Hexachlorobenzene	10.0	ng/L	●	●	●	

Table 5-1
Status of Parameters - Monitored, Found and Limited

ATG	PARAMETER	RMDL	UNIT	Monitored	Found	Limited	Notes
23	Hexachlorobutadiene	10.0	ng/L	●	●	●	
23	Hexachlorocyclopentadiene	10.0	ng/L	●	●		31
23	Hexachloroethane	10.0	ng/L	●	●	●	
23	Octachlorostyrene	10.0	ng/L	●	●	●	
23	Pentachlorobenzene	10.0	ng/L	●	●		32
24	2,3,7,8 TCDD	20.0	pg/L	●		●	33
24	Octachlorodibenzo-p-dioxin	30.0	pg/L	●	●	●	
24	Octachlorodibenzofuran	30.0	pg/L	●	●	●	
24	Total H6CDD	30.0	pg/L	●	●	●	
24	Total H6CDF	20.0	pg/L	●	●	●	
24	Total H7CDD	30.0	pg/L	●	●	●	
24	Total H7CDF	30.0	pg/L	●	●	●	
24	Total PCDD	20.0	pg/L	●	●	●	
24	Total PCDF	15.0	pg/L	●	●	●	
24	Total TCDD	20.0	pg/L	●	●	●	
24	Total TCDF	15.0	pg/L	●	●	●	
25	Oil and grease	1.0	mg/L	●	●	●	
27	PCBT	0.1	ug/L	●	●	●	

Note:

ATG = Analytical Test Group
RMDL = Regulation Method Detection Limit
UNIT mg/L = milligram/litre
ug/L = microgram/litre
ng/L = nanogram/litre
pg/L = picogram/litre

Table 5-1
Status of Parameters - Monitored, Found and Limited

Notes: **Limited List - Reasons for not placing "Found" Parameters on Limited Parameter List**

1,2 - replaced by surrogate DOC, sector wide
3 - rejected for limits - see page 62
4 - replaced by surrogate TSS, sector wide
5 - found at four plants: pass-through at three, one shutdown
6 - found at two plants: pass-through at one, source eliminated at one
7 - found at five plants: source eliminated at three, analytical interference caused high MDL at two
8 - found at four plants: source eliminated at two, analytical interference caused high MDL at two
9 - found at three plants: pass-through at two, analytical interference caused high MDL at one
10 - found at fourteen plants: pass-through at seven, average less than RMDL at two, insufficient data at one, analytical interference caused high MDL at one, source eliminated at three
11 - found at five plants: source eliminated at three, analytical interference caused high MDL at one, surrogate parameter used at one
12 - found at five plants: source eliminated at three, analytical interference caused high MDL at two
13 - found at four plants: source eliminated at three, analytical interference caused high MDL at one
14 - found at four plants: source eliminated at two, analytical interference caused high MDL at two
15 - found at four plants: source eliminated at two, analytical interference caused high MDL at two
16 - found at three plants: source eliminated at two, analytical interference caused high MDL at one
17 - found at one plant: stream at approximately RMDL level now routed to treatment
18 - found at one plant: average concentration at RMDL
19 - found at three plants: pass-through at two, source eliminated at one
20 - found at one plant: stream now routed to treatment
21 - found at nine plants: pass-through at two, source eliminated at three, insufficient data at one, average concentration less than RMDL at two, surrogate parameter used at one
22 - found at two plants: stream now routed to treatment at one, average concentration at RMDL at one
23 - found at one plant: pass-through
24 - found at one plant: insufficient data
25 - found at one plant: stream now routed to treatment and source eliminated
26 - found at one plant: pass-through
27 - found at one plant: average concentration less than RMDL
28 - found at three plants: one shutdown, surrogate used at one, stream now routed to treatment at one
29 - found at one plant: pass-through
30 - found at one plant: pass-through
31 - found at two plants: pass-through at one, source eliminated at one
32 - found at three plants: pass-through at two, average concentration at RMDL at one
33 - limited as a parameter of concern although not found in sector effluents

TABLE 5-2

CHEMICALS ON THE CANDIDATE SUBSTANCES LIST FOR BANS OR PHASE-OUT LIMITED AT OCM SECTOR PLANT SITES

Bans or Phase-out Parameter	# of Sites where Limited	Plant Sites
Arsenic	two	Amoco Chemicals Ltd. Du Pont Canada Inc. (Maitland site)
Mercury	five	Amoco Chemicals Ltd. Cornwall Chemicals Ltd. Dow Chemical Canada Inc. Du Pont Canada Inc. (Kingston site) Ethyl Canada Inc.
1,4-Dichlorobenzene	four	Amoco Chemicals Ltd.[1] Du Pont Canada Inc. (Maitland site)[2] Ethyl Canada Inc.[3] Polysar Rubber Corporation[4]
Phenanthrene	one	Ethyl Canada Inc.
Hexachlorobenzene	three	Cornwall Chemicals Ltd.[5] Dow Chemical Canada Inc. Du Pont Canada Inc. (Maitland site)
PCDDs/PCDFs	five	Chinook Group Limited Cornwall Chemicals Ltd. Dow Chemical Canada Inc. Du Pont Canada Inc. (Maitland site) Geon Canada Inc.
PCBs	one	Stepan Canada Ltd.

Code Explanations

1	- limited through 1,2 dichlorobenzene as surrogate
2	- limited through carbon tetrachloride as surrogate
3	- limited through 1,2-dichloroethane as surrogate
4	- limited through methylene chloride as surrogate
5	- limited through hexachloroethane as surrogate

TABLE 5-3
U.S. EPA LIMITS FOR THE OCPSF SECTOR

All data in ug/L	End of Pipe Biological Treatment		No End of Pipe Biological Treatment	
Parameter	**Daily Maximum**	**Monthly Average**	**Daily Maximum**	**Monthly Average**
Acenaphthene	59	22	47	19
Acenaphthylene	59	22	47	19
Acrylonitrile	242	96	232	94
Anthracene	59	22	47	19
Benzene	136	37	134	57
Benzo(a)anthracene	59	22	47	19
3,4-Benzofluoranthene	61	23	48	20
Benzo(k)fluoranthene	59	22	47	19
Benzo(a)pyrene	61	23	48	20
Bis(2-ethylhexyl)phthalate	279	103	258	95
Carbon Tetrachloride	38	18	380	142
Chlorobenzene	28	15	380	142
Chloroethane	268	104	295	110
Chloroform	46	21	325	111
2-Chlorophenol	98	31	-	-
Chrysene	59	22	47	19
Di-n-butyl phthalate	57	27	43	20
1,2-Dichlorobenzene	163	77	794	196
1,3-Dichlorobenzene	44	31	380	142
1,4-Dichlorobenzene	28	15	380	142
1,1-Dichloroethane	59	22	59	22
1,2-Dichloroethane	211	68	574	180
1,1-Dichloroethylene	25	16	60	22
1,2-trans-Dichloroethylene	54	21	66	25
2,4-Dichlorophenol	112	39	-	-
1,2-Dichloropropane	230	153	794	196
1,3-Dichloropropylene	44	29	794	196
Diethyl phthalate	203	81	113	46

TABLE 5-3
U.S. EPA LIMITS FOR THE OCPSF SECTOR

All data in ug/L	End of Pipe Biological Treatment		No End of Pipe Biological Treatment	
Parameter	Daily Maximum	Monthly Average	Daily Maximum	Monthly Average
2,4-Dimethylphenol	36	18	47	19
Dimethyl phthalate	47	19	47	19
4,6-Dinitro-o-cresol	277	78	277	78
2,4-Dinitrophenol	123	71	4291	1207
2,4-Dinitrotoluene	285	113	-	-
2,6-Dinitrotoluene	641	255	-	-
Ethylbenzene	108	32	380	142
Fluoranthene	68	25	54	22
Fluorene	59	22	47	19
Hexachlorobenzene	28	15	794	196
Hexachlorobutadiene	49	20	380	142
Hexachloroethane	54	21	794	196
Methyl Chloride	190	86	295	110
Methylene Chloride	89	40	170	36
Naphthalene	59	22	47	19
Nitrobenzene	68	27	6402	2237
2-Nitrophenol	69	41	231	65
4-Nitrophenol	124	72	576	162
Phenanthrene	59	22	47	19
Phenol	26	15	47	19
Pyrene	67	25	48	20
Tetrachloroethylene	56	22	164	52
Toluene	80	26	74	28
Total Chromium	2770	1110	2770	1110
Total Copper	3380	1450	3380	1450
Total Cyanide	1200	420	1200	420
Total Lead	690	320	690	320
Total Nickel	3980	1690	3980	1690

TABLE 5-3
U.S. EPA LIMITS FOR THE OCPSF SECTOR

All data in ug/L	**End of Pipe Biological Treatment**		**No End of Pipe Biological Treatment**	
Parameter	**Daily Maximum**	**Monthly Average**	**Daily Maximum**	**Monthly Average**
Total Zinc	2610	1050	2610	1050
1,2,4-Trichlorobenzene	140	68	794	196
1,1,1-Trichloroethane	54	21	59	22
1,1,2-Trichloroethane	54	21	127	32
Trichloroethylene	54	21	69	26
Vinyl Chloride	268	104	172	97

Best Practicable Technology (BPT) Limits				
pH	6 - 9		-	-
Total Suspended Solids	115-216*	36-67*	-	-
Biochemical Oxygen Demand	48-163*	18-61*	-	-
* - Seven Sub-category Ranges Given				

TABLE 5-4

ESTIMATED LOADING REDUCTIONS UNDER THE LIMITS REGULATION

Contaminants	Current Loadings (tonnes/yr)	Loadings Under Limits (tonnes/yr)	Reduction (tonnes/yr) (Percent)
Conventional*	2754	1812	942 (34%)
EMPPL	227	120	107 (47%)
Total	2981	1932	1049 (35%)

* includes TKN(Ammonia), Nitrate, DOC, TSS, Phosphorus, Sulphide, Phenolics, Cyanide, and Oil & Grease

6.0 THE EFFLUENT LIMITS REGULATION

Introduction

This section highlights the main requirements specified in the Regulation. The legal language of the Regulation is simplified, the reasons for some of the requirements are elaborated, and directions are provided to additional information to assist in the compliance with the Regulation's requirements. A copy of the legal version of the Regulation is provided in Appendix C.

6.1 OVERVIEW OF THE REGULATION

The Effluents Limits Regulation for the Organic Chemical Manufacturing (OCM) Sector is made under the Environmental Protection Act of the Province of Ontario. Its full title is, "Effluent Monitoring and Effluent Limits - Organic Chemical Manufacturing Sector".

The purpose of the Regulation is to reduce the quantity of contaminants discharged from the OCM Sector Plants. This will be done by:

- placing loading limits on the discharge of specific contaminants
- requiring effluents to be non-acutely lethal
- monitoring cooling water and
- evaluating storm water discharges

The Regulation requirements with respect to monitoring begin ninety days after the day on which the Regulation is filed. The requirements to meet the chemical parameter and lethality limits come into force three years after the day on which the Regulation is filed. The three year implementation period is provided to allow plants to install Best Available Technology (BAT) or to modify their processes to meet the limits. The current projection of the filing date is sometime early in January 1995.

The Regulation requires that the listed discharger plants sample and analyze their designated process, cooling water and combined effluents at the specified monitoring frequencies.

Plants must meet daily and monthly average loading limits for process effluents that are set out for each plant in Schedule 2 of the Regulation. All process effluents must also meet concentration limits for polychlorinated dibenzodioxins and dibenzofurans. All final discharges must pass acute lethality tests using rainbow trout and Daphnia magna.

Plants must also monitor their cooling water and combined effluent discharges for a list of assessment parameters shown in Schedule 4 of the Regulation. These effluents must also meet the acute lethality limits.

Speedy reporting of non-compliances and specified record keeping in support of the monitoring are other main requirements.

The following documents, which provide "how to" information, are referenced in the Regulation:

- "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater", Laboratory Services Branch, Ministry of Environment and Energy, August 1994
- "Protocol for Conducting a Storm Water Control Study", Ministry of Environment and Energy, August 1994
- Four Environment Canada Biological Test Method Publications:
    - "Reference Method for Determining Acute Lethality of Effluents to Rainbow Trout", EPS 1/RM/13, July 1990
    - "Reference Method for Determining Acute Lethality of Effluents to Daphnia magna", EPS 1/RM/14, July 1990
    - "Test of Larval Growth and Survival Using Fathead Minnows", EPS 1/RM/22, February 1992
    - "Test of Reproduction and Survival Using the Cladoceran Ceriodaphnia dubia", EPS 1/RM/21, February 1992

The requirements of the Regulation are organized under ten parts covering forty-one sections. The requirements under each of the ten parts can be summarized as follows:

Part I - General

- definitions; purpose; application; obligations with respect to legal instruments; non-application of the General Effluent Monitoring Regulation; by-passes; sampling and analytical procedure - reference to the sampling and analytical protocol document

Part II - Sampling Points

- the sampling points as listed in the Schedules are to be used; new sampling points require notification of the Director

Part III - Calculation of Loadings

- requirements for the calculation of loadings for process and process batch effluents, cooling water and combined effluents

Part IV - Parameter and Lethality Limits

- compliance requirements with loading limits listed in Schedule 2; concentration limits for 2,3,7,8-tetrachlorodibenzo-para-dioxin, 2,3,7,8-tetrachlorodibenzofuran and seventeen 2,3,7,8-substituted dioxin and furan congeners expressed in terms of Toxic Equivalent Concentration (TEQ); lethality limits at plant outfalls based on rainbow trout and Daphnia magna testing

Part V - Monitoring - Chemical Parameters

- monitoring requirements -- sample pick-up times, analytical obligations for daily, weekly, quarterly process effluent sampling and annual QA/QC sampling; provision for reduced frequency of monitoring from daily to three times per week for good performance; cooling water and combined effluent chemical parameter assessment

Part VI - Monitoring - Acute Lethality and Chronic Toxicity

- acute lethality testing with rainbow trout and Daphnia magna; requirement for a Toxicity Elimination Report if effluents are toxic; chronic toxicity testing with Fathead Minnows and Ceriodaphnia dubia

Part VII - Effluent Volume

- flow measurement and accuracy requirements; calculation of plant volumes

Part VIII - Storm Water Control

- requirement for a storm water control study as outlined in the referenced storm water control study protocol; exemption criteria; timing of study completion

Part IX - Records and Reports

- record keeping; annual report for the public; reports to the director - general information, non-compliance with limits, quarterly reports of loadings and flow, semi-annual reports of chronic toxicity results

Part X - Commencement and Revocation Provisions

- revocation of the OCM Sector Monitoring Regulation; in force dates for the commencement of monitoring and flow measurement and for compliance with limits

Schedules -

- seven schedules, referenced in the Regulation, follow the text of the Regulation

6.2 EXPLANATORY NOTES

In this section, the requirements under each of the ten parts and forty-one sections of the Regulation are discussed in more detail with elaboration of the rationale behind the requirements.

PART I - GENERAL

Section 1 - Interpretation

Section 1 provides definitions to explain and to clarify key terms used in the Regulation to ensure a common understanding. The definitions cover:

- terms having several possible interpretations
- technical terms which may not be in common use
- terms which have a different meaning in the Regulation from those in the dictionary
- terms specific to the OCM Regulation

Section 2 - Purpose

The purpose of the Regulation is to control the quantity of contaminants discharged to watercourses by the Sector plants.

Section 3 - Application

The Regulation only applies to the twenty-six plants listed in Schedule 1. It does not apply to dischargers of effluents to a Municipal sewer. New plants or new effluents can be brought under regulation through amendments.

Section 4 - Obligations Under Approvals, Orders, etc.

The Regulation does not exempt listed plants from any other obligations under Certificates of Approval, Control Orders, Directions or other instruments issued under any Act.

The Ministry will endeavour to ensure that duplication of requirements is avoided but in cases where duplication exists, the more stringent requirements will apply.

Section 5 - Non-Application of the General Effluent Monitoring Regulation

The tie-in between the OCM Sectoral Monitoring Regulation (O. Regulation 209/89) and the General Effluent Monitoring Regulation (O. Regulation 695/88) has been severed. The Sectoral Monitoring Regulation is revoked with the filing of this Regulation and therefore the General Effluent Monitoring Regulation becomes void.

Section 6 - By-passes

On the date when the limits come into effect, plants will not be able to discharge any process effluent unless it flows past a regulated sampling point.

Section 7 - Sampling and Analytical Procedures

The procedures for sampling and analysis to be used under the Regulation are referenced in a Ministry document, "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater", September 1993[17]. The Protocol provides specific information on sampling methods, sample containers and volumes, preservation chemicals and maximum storage times.

Similarly, on the analytical side, the Protocol provides information on sample preparation, methods of analysis, required method detection limits and laboratory quality control.

The Regulation requires that all sampling equipment be maintained to ensure that the samples collected, reflect the level of discharge.

PART II - SAMPLING POINTS

Section 8 - Sampling Points To Be Used

The sampling points to be used are specified for each plant - Schedules 2 and 3 for sampling points on process effluent and process effluent batch streams and Schedule 4 for sampling points for assessment of cooling water and combined effluents.

The discharger must use the designated sampling points no later than ninety days after the day on which the Regulation is filed.

All of the sampling points have been designated prior to the filing of the Regulation.

The detailed official record of the sampling points for each plant, including identification number, name and plot plan location, signed and dated by a plant official, is on file with the Ministry and is linked to the Regulation through the reference to the record on Schedules 2, 3 and 4 in the Regulation.

The establishment of new sampling points or the elimination of current sampling points listed in the Regulation requires written notification of the Director within thirty days of the change. The notification must include the name, identification number and location of the sampling point together with a plot plan showing the location of all of the sampling points to be regulated.

For pH measurement only, subsections 23(7) and 23(8) allow the use of an alternate sampling point located downstream of the designated sampling point but prior to discharge to surface water or prior to discharge to a common industrial sewer. Written notification and location information must be provided to the Director prior to use of the alternate sampling point.

Where on-line pH measurement is used, the location of the installation does not need to be at the exact location of the designated sampling point where composite samples are being taken, as long as the pH measurement at its location is representative of the pH at the designated sampling point.

PART III -- CALCULATION OF LOADINGS

Section 9 - Calculation of Loadings - General

The actual analytical concentration value is to be used in loading calculations unless it is less than 1/10 of the Regulation Method Detection Limit (see the "Protocol For The Sampling And Analysis of Industrial/Municipal Waste Water"[17]) in which case the loading is deemed to be zero for that parameter.

The loading calculations for process effluents and process batch effluents must be done as soon as is reasonably possible after the analytical results are available. For cooling water and combined effluents, loading calculations must be done, at least in time to meet the quarterly reporting.

Section 10 - Calculation of Loadings - Process Effluent - General

A daily plant loading in kilograms per day must be calculated for each limited parameter for each designated process effluent stream whenever samples are required to be collected (see Schedule 2 for frequency of sample collection). The daily plant loading for sites with single process effluent streams is the single stream loading.

For sites with multiple process effluent streams, the daily plant loading for each limited parameter is the sum of the loadings of that parameter in the individual process effluent streams designated for sampling for that parameter (see Schedule 3).

A monthly average process effluent plant loading in kilograms per day must be calculated for all parameters sampled daily (or thrice-weekly) or weekly during each month. The monthly average plant loading is the arithmetic mean of the daily plant loading values.

Section 11 - Calculation of Loadings - Process Effluent - Batch

A process effluent batch loading in kilograms per batch must be calculated for each designated process effluent batch stream (see Schedule 3).

Section 12 - Calculation of Loadings - Cooling Water

The calculations are done in the same way as for process effluents to provide a daily cooling water effluent plant loading once per week and a monthly average cooling water effluent plant loading based on the average of four weekly determinations.

Section 13 - Calculation of Loadings - Combined Effluent

The daily and monthly average combined effluent plant loadings are calculated in the same way as for cooling water.

Section 14 - Calculation of Additional Loadings - Combined Effluent

The combined effluent designation allows a plant to monitor several cooling water streams (including possible storm water contributions) and a co-mingled treated process effluent stream(s) at a single point downstream of their confluence rather than requiring individual cooling water stream analysis.

For each combined effluent stream, the loading contributed from the process effluent stream flowing into the combined effluent must be calculated for parameters common to the streams for the days on which the combined effluent stream is sampled.

Daily and monthly average process effluent contributions to the loadings in the combined effluent stream must be calculated. The process effluent loading contributions are the process loadings calculated only for the day on which the combined effluent is sampled.

PART IV - PARAMETER AND LETHALITY LIMITS

Section 15 - Parameter Limits

Each plant must meet the daily and monthly average process effluent plant loadings specified in Columns 3 and 4 respectively of its specific Schedule 2 of the Regulation for the parameters shown in Column 1.

In addition, plants with process effluent batch discharges must meet the batch discharge limits set out in Column 5 of Schedule 2.

All plants must ensure that their process and process batch effluents meet the following concentration limits for three polychlorinated dibenzodioxin and dibenzofuran groups:

• 2,3,7,8-tetrachlorodibenzo-p-dioxin	<20 picograms/L
• 2,3,7,8-tetrachlorodibenzofuran	<50 picograms/L
• total toxic equivalent concentration (TEQ) of seventeen 2,3,7,8 substituted congeners	≤60 picograms/L

A listing of the 2,3,7,8 substituted congeners and the method for calculating their total toxic equivalent concentration are described in the Sampling and Analytical Protocol[17].

Plants where polychlorinated dibenzodioxins and dibenzofurans (PCDD/PCDFs) have been found have quarterly PCDD/PCDF self-monitoring requirements set out in their Schedule 2 or 3 tables.

Process effluents and process batch effluents must meet a pH limit range of 6.0 to 9.5 at all times. When alternate sampling points are used for pH, the 6.0 to 9.5 requirement also applies.

Section 16 - Lethality Limits

Acute lethality limits apply only to those sampling points that are designated in Schedule 5. Grab samples from the designated sampling points on process, process batch, cooling water and combined effluent streams must be non-toxic to rainbow trout and *Daphnia magna* as demonstrated by specific acute lethality tests where the mortality must not exceed 50% of the organisms in 100% effluent.

PART V - MONITORING - CHEMICAL PARAMETERS

Section 17 - Monitoring - General

Collection of samples is not required on a day when there is no process effluent discharged from the plant.

The Regulation requires that sufficient sample volume be taken to perform the required analyses and that all analyses be completed as soon as is reasonably possible.

A three hour composite sample pick-up window between 7:00 a.m. and 10:00 a.m. is provided. The nominal twenty-four hour composite sample period can be as short as twenty-one hours or as long as twenty-seven.

For plants with a large number of sampling points, the Director may allow deviations from the sample pick-up window upon written request but the Director may also revoke the allowance in writing if circumstances at the plant warrant it.

Sections 18, 19, 20 - Monitoring - Process Effluent - Daily, Weekly, Quarterly

The requirements for daily, weekly and quarterly sampling and analysis are set out in Schedule 2. For multi-process effluent plants, the specific parameters to be analyzed in each effluent are shown in Schedule 3. The requirement for daily pH monitoring resides in a separate section of the Regulation (Section 23) and therefore pH is not specifically listed in Schedule 2.

For parameters with an initial daily monitoring frequency requirement, relief is provided to three times per week monitoring for good performance. The performance criterion is a monthly average plant loading equal to or less than seventy-five percent of the monthly average plant loading limit for that parameter for twelve consecutive months.

A return to daily monitoring for a parameter is automatic, if during any twelve consecutive months, the daily plant loading limit for the thrice-weekly parameter is exceeded three times or the monthly average loading limit is exceeded twice. To qualify again for thrice-weekly monitoring, the good performance criterion must be met for that parameter.

Weekly samples must be collected at least four days apart. Quarterly samples must be collected at least forty-five days apart on the same day as the weekly samples.

Section 21 - Monitoring - Process Effluent - Batch

Each process effluent batch discharge must be sampled over the period of the batch discharge.

Section 22 - Monitoring - Process Effluent - Quality Control

Duplicate, travelling blank and travelling spiked blank samples, making up the Quality Assurance and Quality Control (QA/QC) field samples are required annually beginning in the year after the year of filing of the Regulation.

The duplicate samples are to be analyzed for the same parameters as are shown in Schedule 2 for weekly and quarterly monitoring for the plant. QA/QC samples must be collected at least six months apart on the same day as the weekly process effluent samples.

The sampling and analytical protocol[17] provides additional directions on QA/QC requirements.

Section 23 - Monitoring - Process Effluent - pH Measurement

Plants are required to measure pH daily by collecting three grab samples over a 24 hour period. The first sample must be taken between 7:00 a.m. and 10:00 a.m. or during the composite sample pickup time window allowed by the Director. The other two grab samples may be collected at any time during the 24 hour period as long as all three are collected at least four hours apart.

An on-line pH analyzer may be used in place of grab sampling. The first reading of pH must be taken in the same time period as would be applicable to a grab sample. Two other readings must be taken over the 24 hour period so that all three readings are at least four hours apart.

Any recorded pH readings over the 24 hour period outside of the regulated pH range of 6.0 - 9.5, not the result of analyzer malfunction, are reportable as exceedances.

For pH measurement, upon written notification of the Director, the plant may use an alternate sampling point downstream of the designated sample point for composite samples, but before the point of discharge to a surface water or to an industrial sewer. A composite sample for pH is required for process effluent batch streams.

Sections 24, 25 - Monitoring - Cooling Water/Combined Effluent- Weekly Assessment

There are no discharge limits in the Regulation for cooling water and combined effluents. Cooling water and combined effluents require weekly monitoring for the assessment parameters shown in Schedule 4 for each plant. The samples are to be picked-up on the same day as the weekly process effluent samples. A minimum interval of four days is required between successive sampling.

Section 26 - Monitoring - Cooling Water and Combined Effluent - pH and Specific Conductance Measurement

Three grab samples, in a 24 hour period, at least four hours apart, for each of pH and specific conductance are required for assessment monitoring of cooling water and combined effluents.

An on-line analyzer may be used for pH and specific conductamce in place of grab samples. Any three pH and specific conductance values, at least four hours apart, recorded by the on-line unit in a 24 hour period, may be reported.

PART VI - MONITORING - ACUTE LETHALITY AND CHRONIC TOXICITY

Sections 27, 28 - Monitoring - Acute Lethality Testing - Rainbow Trout, Daphnia magna

Both rainbow trout and Daphnia magna acute lethality single concentration, 100% effluent tests are required monthly at all sampling points where chemical monitoring is required (process effluents, process batch effluents, combined effluents and cooling water). All of these sampling points are listed in Schedules 2, 3 and 4 of the Regulation.

Acute lethality limits apply only to sampling points on final discharges to watercourses. These points are designated for each plant in Schedule 5. The acute lethality testing of the remaining Schedule 2, 3 and 4 sampling points is for assessment purposes only.

Both lethality samples must be taken on the same day, tied to a day when weekly sampling for the analysis of limited parameters is being done. An interval of at least fifteen days is required between successive monthly lethality tests.

The acute lethality testing frequency at a sampling point for either species can be reduced to quarterly following twelve consecutive monthly passes for that species (mortality of no more than 50% of the test species). Notification of the Director as to the change in frequency is required. An interval of at least forty-five days is required between successive quarterly tests.

A single failure at the quarterly frequency for a species, causes sampling to revert to monthly until twelve consecutive passes for that species are achieved.

The rainbow trout and Daphnia magna acute lethality tests are to be performed according to Environment Canada procedures referenced in the Regulation.

Section 29 - Assessment Monitoring - Acute Lethality

If testing at any acute lethality sampling point results in three test failures in any twelve consecutive months for rainbow trout or Daphnia magna, the discharger must prepare a Toxicity Elimination Report for the species for which the failure occurred.

The information required for the Report is set out in subsection 29(3). The Report must be submitted to the Director within twelve months of the date of the third test failure.

Section 30 - Monitoring - Chronic Toxicity Testing

Fathead Minnow and Ceriodaphnia dubia chronic toxicity testing is required semi-annually for the discharge effluent sampling points listed in Schedule 6 of the Regulation but only after twelve consecutive passes of both rainbow trout and Daphnia magna acute lethality tests at those points.

The intent is to require chronic toxicity testing on effluents that are non-acutely lethal to both rainbow trout and Daphnia magna. An interval of at least ninety days is required between successive sampling.

PART VII - EFFLUENT VOLUME

Section 31 - Flow Measurement

Daily flow measurements within an accuracy of ±15% are required for process and process batch effluents. For cooling water and combined effluents flow measurement accuracy must be ± 20%.

A daily volume in cubic metres must be determined for each process, cooling water and combined effluent. A batch volume in cubic metres must be determined for each process batch effluent.

Proof of accuracy of flow measurement by calibration or certification is required within ninety days after the day on which the Regulation is filed.

New or altered flow measurement devices require proof of accuracy within two weeks after the day on which the new or altered installation is used.

Maintenance and calibration schedules for each flow measurement system must be implemented.

Section 32 - Calculation of Plant Volumes

For process, cooling water and combined effluents, daily and monthly average plant volumes discharged, in cubic metres per day, must be calculated.

PART VIII - STORM WATER CONTROL

Section 33 - Storm Water Control Study

A storm water control study, completed in accordance with the requirements of the referenced Ministry document, "Protocol for Conducting a Storm Water Control Study", August 1994[18] is required within two years after the day on which the Regulation is filed.

The study may be postponed for up to one year after limits come into force upon written notification of the Director within two years after the day on which the Regulation is filed.

A plant meeting the exemption criteria in the storm water study protocol need not comply with the study requirement provided the Director is notified in writing within one year after the day on which the Regulation is filed.

PART IX - RECORDS AND REPORTS

Section 34 - Record Keeping

Within ninety days after the day on which the Regulation is filed, each discharger must keep all records specified by the Regulation for a period of three years and upon request, make them available to the Ministry.

Specific records in electronic format are required for the following:

- daily, thrice weekly (where applicable), weekly and quarterly process effluent and process batch effluent monitoring
- pH measurement
- weekly cooling water and combined effluent monitoring including pH and specific conductance

Other records that must be kept by each discharger include:

- sampling and analytical procedures and sample pick-up information
- acute lethality and chronic toxicity test results
- flow device maintenance and calibration
- all problems or malfunctions with a potential to affect compliance
- all by-passes
- all process changes impacting the quality of the discharge
- the monthly average production in tonnes per day for each of the products listed in Schedule 7 (beginning with the first day of the month after the month in which the Regulation is filed)

The arithmetic mean of the first twelve months of the monthly average production record has been designated as the reference daily production for each product listed in Schedule 7.

Section 35 - Reports Available to the Public

A report covering the environmental control performance of the plant summarized under seven specified topics listed in the Regulation, is to be prepared on or before June 1 in each year and made available to the public on request.

Section 36 - Reports to the Director - General

Notification of the Director in writing is required for the following:

- change of plant name or ownership
- any process change, redirection or change in character of an effluent that affects the quality of the effluent for a period of one week or longer
- operation for more than ninety days at less than 75% of the reference daily rate of production for any of the products shown in Schedule 7.

Section 37 - Reports to the Director - Compliance with Section 6 and Part IV

All by-passes of sampling points, all exceedances of any of the parameter limits shown in Schedule 2 and all failures to meet the regulated pH range and acute lethality limits must be reported orally to the Director and followed-up in writing, both as soon as is reasonably possible.

Section 38 - Quarterly Reports to the Director

Quarterly reports to the Director in electronic and hard copy are required no later than forty-five days after the end of each quarter and must provide the following information:

- a list of all exceedances of limits
- the monthly average plant loadings and plant flows and the highest and lowest daily plant loadings and plant flows for each month for limited and assessment parameters
- the highest and lowest batch loadings for each month including the number of batches discharged each month
- the monthly average and the highest and lowest daily process effluent contributions for each parameter in common with a combined effluent monitored parameter
- the number of process effluent discharge days in each month
- the highest and lowest pH readings for each month for each process effluent and batch process effluent monitoring stream
- the highest and lowest pH and specific conductance readings for each month for each cooling water and combined effluent stream.

Section 39 - Reports to the Director - Chronic Toxicity Testing

When the chronic toxicity testing requirement comes into force (following twelve consecutive monthly passes of both acute lethality tests), semi-annual reports on the results of chronic toxicity testing are to be sent to the Director within forty-five days of the end of each semi-annual period. The report is to include a plot of percentage reduction in growth or reproduction and a calculation of the concentration at which 25% reduction in growth or reproduction would occur.

PART X - COMMENCEMENT AND REVOCATION PROVISIONS

Section 40 - Revocation of O. Regulation 209/89

The following OCM Sector Regulation and three amendments are revoked on the date that is ninety days after the day on which this Regulation is filed:

- O. Reg 209/89 - filed April 25, 1989
- O. Reg 532/89 - filed September 29, 1989
- O. Reg 45/90 - filed January 26, 1990
- O. Reg 416/90 - filed July 31, 1990

Section 41 - Commencement of Parts IV, V, VI and VII

Part IV, Parameter and Lethality Limits, which requires compliance with parameter and lethality limits, comes into force on the day that is three years after the day on which the Regulation is filed.

Parts V and VI, Monitoring - Chemical Parameters/Acute Lethality and Chronic Toxicity and Part VII, Effluent Volume, requiring effluent monitoring and flow measurement, come into force ninety days after the day on which the Regulation is filed.

Schedules in the Regulation

The following seven schedules form an integral part of the Regulation:

SCHEDULE 1 - List of Regulated Plants

SCHEDULE 2 - Process Effluent Limits and Monitoring Frequency

SCHEDULE 3 - Process Effluent Sampling for Plants with More Than One Process Effluent Sampling Point

SCHEDULE 4 - Combined Effluent and Cooling Water Assessment

SCHEDULE 5 - Designated Sampling Points for Lethality Limits

SCHEDULE 6 - Designated Sampling Points for Chronic Toxicity Assessment

SCHEDULE 7 - Reference Products

7.0 REFERENCES

1. Ontario Ministry of the Environment, Municipal-Industrial Strategy for Abatement (MISA), "A Policy and Program Statement of the Government of Ontario on Controlling Municipal Discharges into Surface Waters", June 1986

2. Ontario Ministry of the Environment, Hazardous Contaminants Branch, "The Effluent Monitoring Priority Pollutants List", ISBN: 0-7729-2784-7, (1987)

3. Ibid, 1988 Update, ISBN: 0-7729-5450-X, March 1989

4. Ontario Ministry of the Environment, "Issues Resolution Process -- Final Report Summary", ISBN 0-7729-8974-5, September 1991

4a. Ibid, MISA Issues Resolution Process, Issue Resolution Committee Reports, June 1990

5. Science Applications International Corporation, "BAT Status Site Visit Information Reports for the OCM Sector - Final Report", January 1993

6. Ontario Ministry of the Environment, MISA, "The Development Document for the Effluent Monitoring Regulation for the Organic Chemical Manufacturing Sector", ISBN: 0-7729-5565-4, May 1989

7. Ontario Ministry of the Environment, MISA, "Six-Month Monitoring Data Report - Organic Chemical Manufacturing Sector", ISBN: 0-7729-8922-2, February 1992

8. Ibid, "Report on the Assessment of the Quality Assurance and Quality Control Data for the Organic Chemical Manufacturing Sector", ISBN: 0-7778-0333-X, March 1993

9. Ibid, "Twelve-Month Monitoring Data Report - Organic Chemical Manufacturing Sector", ISBN: 0-7778-0032-2, September 1992

10. Osinga, I and Melcer H., Environment Canada, Wastewater Technology Centre, "Review of Ontario Organic Chemicals Sector Wastewater Treatment Plant Performance", December 1988

11. Science Applications International Corporation, Prepared for the Ontario Ministry of the Environment, "Performance and Cost Evaluation of Best Available Technology Options for the Ontario Organic Chemical Manufacturing (OCM) Sector", March 1993

12. U.S. EPA, "Development Document for Effluent Limitations Guidelines and Standards for the Organic Chemicals, Plastics and Synthetic Fibers", Volumes 1 and 2, EPA 440/1-87/009, October 1987

13. Science Applications International Corporation, Prepared for the Ontario Ministry of the Environment, "BAT Status Site Visit Information Reports for the Ontario Organic Chemical Manufacturing (OCM) Sector", January 1993

14. U.S. Environmental Protection Agency, "Development Document for Effluent Limitations Guidelines and Standards for the Organic Chemicals, Plastics and Synthetic Fibers Point Source Category", Vol 1 and 2, PB 88-171335, October 1987

15. Ontario Ministry of the Environment, Hazardous Contaminants and Water Resources Branches, "Candidate Substances List for Bans or Phase-Outs", ISBN: 0-7729-9764-0, April 1992

15a. Ontario Ministry of Environment and Energy, Hazardous Contaminants and Water Resources Branches, "Candidate Substances For Bans, Phase-Outs or Reductions - Multimedia Revision", ISBN 0-7778-0774-2, October 1993

16. U.S. Environmental Protection Agency, Federal Register, 4UCFR Parts 414 and 416, "Organic Chemicals and Plastics and Synthetic Fibers Category Effluent Limitations Guidelines, Pretreatment Standards, and New Source Performance Standards; Final Rule", November 5, 1987

17. Ontario Ministry of Environment and Energy, MISA, "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater", ISBN 0-7778-1880-9, August 1994

18. Ontario Ministry of Environment and Energy, MISA, "Protocol for Conducting a Storm Water Control Study", ISBN 0-7778-1786-1, August 1994

8.0 APPENDICES

APPENDIX A
SELECTION OF PARAMETERS FOR LIMITS

APPENDIX B
SUMMARY OF CURRENT (1989-90 MONITORING DATA) VERSUS BAT 2 PERFORMANCE DATA FOR THE OCM SECTOR

APPENDIX C
THE DRAFT REGULATION

APPENDIX A

SELECTION OF PARAMETERS FOR LIMITS

The disposition of all found parameters by control point for each plant is shown for each plant in the tables in Appendix A.

PARAMETER REJECTION CRITERIA DETAILS

Pass-Through Parameters

A parameter was deemed to be "pass-through" if it was measured at comparable concentrations in the intake and effluent samples with no known source at the plant based on review of raw material, product, and process information.

Concentrations of pass-through parameters were usually in the 1-2 RMDL range in both the intake and the effluent streams.

Insufficient Data

Presence/absence could not be established in some cases where only two to four data points were available.

Performance values such as variability factors could not be calculated where data for a parameter were reported as mostly "<RMDL" with fewer than six values ">RMDL".

Polychlorinated dibenzo-p-dioxin (PCDD) and polychlorinated dibenzofuran (PCDF) data for a parameter were not disqualified on the basis of insufficient data because it was planned to set limits on PCDDs/PCDFs as "non-measurable" concentrations.

Laboratory Analysis Problems

In cases where a parameter was classified as found on the basis of concentration data as "<LMDL" but where the LMDL was consistently above the RMDL because of laboratory technique or equipment problems, the parameter was examined further with respect to plant processes. If it was judged that plant processes were not likely to use or generate the contaminant, the parameter was rejected for limits.

Parameters with analytical data qualified with a "<WE" (no measurable response - sample dilution) remark code indicating that the sample had to be diluted prior to analysis thereby increasing the detection level value by the dilution factor, were also rejected for limits.

Field Quality Assurance/Quality Control (QA/QC) Problems

The monitoring regulation required the analysis of monthly and quarterly field QA/QC samples. Included were duplicate samples, travelling blank samples and travelling spiked blank samples.

The twelve-month QA/QC database was assessed separately to determine the impact of sampling, sample storage, sample shipment and laboratory recovery techniques on the overall effluent database supplied by each plant.

The QA/QC procedures and results are summarized in a separate Ministry Report entitled, "Report on the Assessment of the Quality Assurance and Quality Control Data for the Organic Chemical Manufacturing Sector"[8]. The QA/QC report concluded that virtually all of the effluent monitoring data were acceptable for use in the development of effluent limits.

No parameters were rejected for limits based on QA/QC data analysis.

Process Changes or Shutdown

The monitoring data, on which the limits development process is based, was obtained in the 1989-90 period. Since that time some plant sites have undergone major changes in the processes that they are currently operating either through product/process changes or process unit shutdowns.

On the basis of documented plant supplied data, parameters were deleted from or added to the candidate list of parameters for limits.

APPENDIX A

SELECTION OF PARAMETERS FOR LIMITS

KEY TO SYMBOLS IN THE TABLE

**** = LIMITED PARAMETER

< = LONG TERM AVERAGE EQUAL TO OR LESS THAN RMDL

A = ANALYSIS PROBLEMS - LABORATORY

AD = NOT FOUND - BASED ON ADDITIONAL DATA

D = INSUFFICIENT DATA

I = INTAKE WATER - SOURCE OF PASS-THROUGH PARAMETER

N = NEW PARAMETER - ADDED BECAUSE OF PROCESS CHANGES

NF = PARAMETER NOT FOUND IN THE GIVEN EFFLUENT AT A MULTI-EFFLUENT SITE BUT ORIGINALLY FOUND IN OTHER SITE EFFLUENTS
= EFFLUENT WHERE THE PARAMETER WAS FOUND NO LONGER EXISTS

P = PROCESS CHANGE - PARAMETER NO LONGER DISCHARGED

Q = QA/QC FIELD SAMPLE PROBLEM

S = PARAMETER REPLACED BY SURROGATE

Note:

Under Sampling Point:

- for designated effluent streams discharging directly into a watercourse, the final destination is indicated as "to River", "to Lake" etc.

- effluent streams which flow into other plant effluents prior to discharge do not have a final watercourse destination indicated

APPENDIX A - Table A-1
Selection of Parameters for Limits

PLANT SITE - CELANESE CANADA INC. - MILLHAVEN				
ATG	PARAMETER	RMDL	UNIT	PR 0400
1	COD	10	mg/L	S
2	Cyanide Total	0.005	mg/L	I
3	Hydrogen ion (pH)			****
4	Ammonia plus Ammonium	0.25	mg/L	****
4	Nitrate+Nitrite	0.25	mg/L	****
4	Total Kjeldahl Nitrogen	0.5	mg/L	****
5	DOC	0.5	mg/L	****
5	TOC	5	mg/L	S
6	Total phosphorus	0.10	mg/L	****
7	Specific conductance	5	uS/cm	S
8	Total suspended solids	5	mg/L	****
8	Volatile suspended solids	10	mg/L	S
9	Aluminum	30.0	ug/L	I
9	Copper	10.0	ug/L	I
9	Zinc	10.0	ug/L	I
10	Antimony	5.0	ug/L	****
11	Chromium (hexavalent)	10.0	ug/L	I
12	Mercury	0.10	ug/L	<
14	Phenolics (4AAP)	2.0	ug/L	****
15	Sulphide	20.0	ug/L	<
16	1,2-Dichloroethane	0.8	ug/L	I
16	Bromodichloromethane	0.8	ug/L	D
16	Chloroform	0.7	ug/L	D
16	Chloromethane	3.7	ug/L	I
16	Methylene chloride	1.3	ug/L	I
17	Benzene	0.5	ug/L	I
17	Toluene	0.5	ug/L	<
19	Biphenyl	0.6	ug/L	P
19	Bis(2-ethylhexyl) phthalate	2.2	ug/L	<
19	Di-n-butyl phthalate	3.8	ug/L	D
23	1,2,3,4-Tetrachlorobenzene	10.0	ng/L	I
23	1,2,3,5-Tetrachlorobenzene	10.0	ng/L	I
23	1,2,3-Trichlorobenzene	10.0	ng/L	I
23	1,2,4-Trichlorobenzene	10.0	ng/L	I
23	Pentachlorobenzene	10.0	ng/L	I
24	PCDDs / PCDFs		pg/L	AD
25	Oil and grease	1.0	mg/L	****

SAMPLING POINTS
PR 0400 - Treatment Plant Effluent

APPENDIX A - Table A-1
Selection of Parameters for Limits

PLANT SITE - BASF CANADA INC. - SARNIA				
ATG	PARAMETER	RMDL	UNIT	OT 0100
1	COD	10	mg/L	S
3	Hydrogen ion (pH)			****
4	Ammonia plus Ammonium	0.25	mg/L	I
4	Nitrate + Nitrite	0.25	mg/L	D
4	Total Kjeldahl Nitrogen	0.5	mg/L	I
5	DOC	0.5	mg/L	****
5	TOC	5	mg/L	S
6	Total phosphorus	0.10	mg/L	****
7	Specific conductance	5	uS/cm	S
8	Total suspended solids	5	mg/L	****
8	Volatile suspended solids	10	mg/L	S
9	Aluminum	30.0	ug/L	I
9	Copper	10.0	ug/L	I
9	Lead	30.0	ug/L	I
9	Zinc	10.0	ug/L	I
14	Phenolics (4AAP)	2.0	ug/L	****
17	Ethylbenzene	0.6	ug/L	S
17	Styrene	0.5	ug/L	****
17	Toluene	0.5	ug/L	I
18	Acrylonitrile	4.2	ug/L	****
25	Oil and grease	1.0	mg/L	****

Process Changes - stream classified as cooling water for assessment monitoring

SAMPLING POINTS
OT 0100 - #2 Plant Storm Sewer to River

APPENDIX A - Table A-1
Selection of Parameters for Limits

PLANT SITE - CORNWALL CHEMICALS LTD. - CORNWALL				
ATG	PARAMETER	RMDL	UNIT	PR 0100
1	COD	10	mg/L	S
3	Hydrogen ion (pH)			****
4	Ammonia plus Ammonium	0.25	mg/L	I
4	Nitrate+Nitrite	0.25	mg/L	I
4	Total Kjeldahl Nitrogen	0.5	mg/L	I
5	DOC	0.5	mg/L	****
5	TOC	5	mg/L	S
6	Total phosphorus	0.10	mg/L	****
7	Specific conductance	5	uS/cm	S
8	Total suspended solids	5	mg/L	****
8	Volatile suspended solids	10	mg/L	S
9	Aluminum	30.0	ug/L	****
9	Beryllium	10.0	ug/L	I
9	Boron	50.0	ug/L	I
9	Cadmium	2.0	ug/L	I
9	Copper	10.0	ug/L	I
9	Molybdenum	20.0	ug/L	I
9	Nickel	20.0	ug/L	****
9	Thallium	30.0	ug/L	I
9	Vanadium	30.0	ug/L	I
9	Zinc	10.0	ug/L	****
11	Chromium (hexavalent)	10.0	ug/L	<
12	Mercury	0.10	ug/L	****
15	Sulphide	20.0	ug/L	****
16	Bromodichloromethane	0.8	ug/L	I
16	Carbon tetrachloride	1.3	ug/L	****
16	Chloroform	0.7	ug/L	S
16	Chloromethane	3.7	ug/L	S
16	Methylene chloride	1.3	ug/L	S
16	Tetrachloroethylene	1.1	ug/L	S
16	Trichloroethylene	1.9	ug/L	S
23	1,2,3-Trichlorobenzene	10.0	ng/L	I
23	Hexachlorobenzene	10.0	ng/L	S
23	Hexachlorobutadiene	10.0	ng/L	S
23	Hexachlorocyclopentadiene	10.0	ng/L	S
23	Hexachloroethane	10.0	ng/L	****
24	PCDDs / PCDFs		pg/L	****
25	Oil and grease	1.0	mg/L	****

SAMPLING POINT PR 0100 - Manhole 26 Effluent to River

APPENDIX A - Table A-1
Selection of Parameters for Limits

PLANT SITE - CHINOOK GROUP LTD. - SOMBRA				
ATG	PARAMETER	RMDL	UNIT	CO 0100
1	COD	10	mg/L	S
3	Hydrogen ion (pH)			****
4	Ammonia plus Ammonium	0.25	mg/L	****
4	Nitrate+Nitrite	0.25	mg/L	I
4	Total Kjeldahl Nitrogen	0.5	mg/L	****
5	DOC	0.5	mg/L	****
5	TOC	5	mg/L	S
6	Total phosphorus	0.10	mg/L	****
7	Specific conductance	5	uS/cm	S
8	Total suspended solids	5	mg/L	****
8	Volatile suspended solids	10	mg/L	S
9	Aluminum	30.0	ug/L	I
9	Chromium	20.0	ug/L	****
9	Copper	10.0	ug/L	I
9	Zinc	10.0	ug/L	****
10	Arsenic	5.0	ug/L	<
11	Chromium (hexavalent)	10.0	ug/L	S
15	Sulphide	20.0	ug/L	D
16	Bromodichloromethane	0.8	ug/L	I
16	Chloroform	0.7	ug/L	D
16	Chloromethane	3.7	ug/L	I
16	Methylene chloride	1.3	ug/L	I
17	Benzene	0.5	ug/L	I
19	Benzylbutylphthalate	0.6	ug/L	I
19	Bis(2-ethylhexyl) phthalate	2.2	ug/L	I
19	Diphenyl ether	0.4	ug/L	I
23	1,2,4-Trichlorobenzene	10.0	ng/L	I
23	Hexachlorobutadiene	10.0	ng/L	I
24	PCDDs / PCDFs	20.0	pg/L	****
25	Oil and grease	1.0	mg/L	****
27	PCBT	0.1	ug/L	D

SAMPLING POINT
CO 0100 - Sump Effluent to River

APPENDIX A - Table A-1
Selection of Parameters for Limits

PLANT SITE - DOW CHEMICAL CANADA INC. - SARNIA									
ATG	PARAMETER	RMDL	UNIT	PR 1700	PR 1900	PR 2000	PR 2200	PR 2300	PR 2100
17	Benzene	0.5	ug/L	I	S	I	D	D	NF
17	Ethylbenzene	0.6	ug/L	I	****	<	D	D	NF
17	Styrene	0.5	ug/L	I	S	<	D	D	NF
17	m-Xylene and p-Xylene	1.1	ug/L	NF	NF	NF	D	D	NF
17	o-Xylene	0.5	ug/L	I	S	<	D	D	NF
19	2,6-Dinitrotoluene	0.7	ug/L	<	<	NF	D	D	<
19	2-Chloronaphthalene	1.8	ug/L	<	<	<	D	D	<
19	Benzylbutylphthalate	0.6	ug/L	I	I	I	D	D	NF
19	Biphenyl	0.6	ug/L	I	I	I	D	D	I
19	Bis(2-chloroethyl)ether	4.4	ug/L	I	S	I	D	D	NF
19	Bis(2-chloroisopropyl)ether	2.2	ug/L	P	****	I	D	D	NF
19	Bis(2-ethylhexyl) phthalate	2.2	ug/L	I	I	NF	D	D	NF
19	Di-n-butyl phthalate	3.8	ug/L	I	I	I	D	D	NF
19	N-Nitrosodi-n-propylamine	3.1	ug/L	<	P	<	D	D	NF
19	Naphthalene	1.6	ug/L	I	I	I	D	D	I
20	2,3,4,5-Tetrachlorophenol	0.4	ug/L	I	I	I	D	D	I
20	2,3,4-Trichlorophenol	0.6	ug/L	<	<	<	D	D	<
20	Phenol	2.4	ug/L	<	NF	<	D	D	NF
23	1,2,4,5-Tetrachlorobenzene	10.0	ng/L	I	****	<	D	D	NF
23	1,2,4-Trichlorobenzene	10.0	ng/L	****	I	I	D	D	****
23	2,4,5-Trichlorotoluene	10.0	ng/L	****	I	<	D	D	****
23	Hexachlorobenzene	10.0	ng/L	****	I	<	D	D	****
23	Hexachlorobutadiene	10.0	ng/L	S	I	I	D	D	****
23	Hexachlorocyclopentadiene	10.0	ng/L	I	I	<	D	D	NF
23	Hexachloroethane	10.0	ng/L	****	I	<	D	D	****
23	Octachlorostyrene	10.0	ng/L	I	I	<	D	D	****
24	PCDDs / PCDFs	15.0	pg/L	****	****	****	****	****	****
25	Oil and grease	1.0	mg/L	****	****	****	****	****	****

SAMPLING POINTS
PR 1700 - Block 90 Feed
PR 1900 - Biox Plant Effluent
PR 2000 - Boiler Feedwater Effluent
PR 2100 - Scott Road Treated Runoff to River
PR 2200 - Lasalle Road Site West Pond to Talfourd Creek
PR 2300 - Lasalle Road Site East Pond to Talfourd Creek

APPENDIX A - Table A-1
Selection of Parameters for Limits

PLANT SITE - DOW CHEMICAL CANADA INC. - SARNIA

ATG	PARAMETER	RMDL	UNIT	PR 1700	PR 1900	PR 2000	PR 2200	PR 2300	PR 2100
1	COD	10	mg/L	S	S	S	D	D	S
2	Cyanide Total	0.005	mg/L	<	<	<	D	D	D
3	Hydrogen ion (pH)			****	****	****	****	****	****
4	Ammonia plus Ammonium	0.25	mg/L	I	****	I	D	D	S
4	Nitrate+Nitrite	0.25	mg/L	I	I	****	D	D	NF
4	Total Kjeldahl Nitrogen	0.5	mg/L	P	****	S	D	D	****
5	DOC	0.5	mg/L	****	****	****	****	****	****
5	TOC	5	mg/L	S	S	S	S	S	S
6	Total phosphorus	0.10	mg/L	****	****	****	****	****	****
7	Specific conductance	5	uS/cm	S	S	S	S	S	S
8	Total suspended solids	5	mg/L	****	****	****	****	****	****
8	Volatile suspended solids	10	mg/L	S	S	S	S	S	S
9	Aluminum	30.0	ug/L	****	****	****	****	****	****
9	Boron	50.0	ug/L	NF	<	<	S	S	****
9	Chromium	20.0	ug/L	<	<	NF	NF	NF	NF
9	Copper	10.0	ug/L	P	<	<	<	<	NF
9	Lead	30.0	ug/L	P	P	NF	<	<	NF
9	Molybdenum	20.0	ug/L	NF	P	I	<	<	<
9	Nickel	20.0	ug/L	P	NF	NF	<	<	NF
9	Vanadium	30.0	ug/L	I	I	<	S	S	S
9	Zinc	10.0	ug/L	P	P	NF	S	S	NF
12	Mercury	0.10	ug/L	NF	NF	NF	S	S	****
14	Phenolics (4AAP)	2.0	ug/L	****	****	****	****	****	****
15	Sulphide	20.0	ug/L	I	P	I	D	D	****
16	1,1,2,2-Tetrachloroethane	4.3	ug/L	S	I	I	D	D	NF
16	1,1,2-Trichloroethane	0.6	ug/L	S	I	I	D	D	****
16	1,1-Dichloroethane	0.8	ug/L	S	I	I	D	D	****
16	1,1-Dichloroethylene	2.8	ug/L	S	NF	I	D	D	NF
16	1,2-Dichloroethane	0.8	ug/L	****	S	NF	D	D	NF
16	1,2-Dichloropropane	0.9	ug/L	S	****	I	D	D	NF
16	Bromodichloromethane	0.8	ug/L	NF	I	I	D	D	NF
16	Bromoform	3.7	ug/L	S	I	I	D	D	NF
16	Carbon tetrachloride	1.3	ug/L	S	I	I	D	D	NF
16	Chloroform	0.7	ug/L	S	I	I	D	D	S
16	Chloromethane	3.7	ug/L	I	I	I	D	D	NF
16	Cis-1,3-Dichloropropylene	1.4	ug/L	S	NF	I	D	D	NF
16	Dibromochloromethane	1.1	ug/L	S	I	I	D	D	NF
16	Methylene chloride	1.3	ug/L	****	NF	I	D	D	NF
16	Tetrachloroethylene	1.1	ug/L	****	NF	NF	D	D	NF
16	Trichloroethylene	1.9	ug/L	****	I	I	D	D	NF
16	Vinyl chloride	4.0	ug/L	****	I	I	D	D	NF

APPENDIX A - Table A-1
Selection of Parameters for Limits

PLANT SITE - DU PONT CANADA INC. - KINGSTON				
ATG	PARAMETER	RMDL	UNIT	PR 0600
1	COD	10	mg/L	S
3	Hydrogen ion (pH)			****
4	Ammonia plus Ammonium	0.25	mg/L	NF
4	Nitrate+Nitrite	0.25	mg/L	NF
4	Total Kjeldahl Nitrogen	0.5	mg/L	I
5	DOC	0.5	mg/L	****
5	TOC	5	mg/L	S
6	Total phosphorus	0.10	mg/L	****
7	Specific conductance	5	uS/cm	S
8	Total suspended solids	5	mg/L	****
8	Volatile suspended solids	10	mg/L	S
9	Aluminum	30.0	ug/L	I
9	Boron	50.0	ug/L	I
9	Copper	10.0	ug/L	I
9	Zinc	10.0	ug/L	I
12	Mercury	0.10	ug/L	****
14	Phenolics (4AAP)	2.0	ug/L	****
15	Sulphide	20.0	ug/L	NF
16	1,1,2,2-Tetrachloroethane	4.3	ug/L	NF
16	1,1,2-Trichloroethane	0.6	ug/L	NF
16	1,1-Dichloroethane	0.8	ug/L	NF
16	1,2-Dichloroethane	0.8	ug/L	NF
16	1,2-Dichloropropane	0.9	ug/L	NF
16	Bromodichloromethane	0.8	ug/L	I
16	Bromoform	3.7	ug/L	NF
16	Bromomethane	3.7	ug/L	NF
16	Chlorobenzene	0.7	ug/L	NF
16	Chloroform	0.7	ug/L	I
16	Chloromethane	3.7	ug/L	NF
16	Cis-1,3-Dichloropropylene	1.4	ug/L	NF
16	Dibromochloromethane	1.1	ug/L	NF
16	Ethylene dibromide	1.0	ug/L	NF
16	Methylene chloride	1.3	ug/L	NF
16	Tetrachloroethylene	1.1	ug/L	NF
16	Trans-1,3-Dichloropropylene	1.4	ug/L	NF
16	Trichlorofluoromethane	1.0	ug/L	NF
16	Vinyl chloride	4.0	ug/L	NF

APPENDIX A - Table A-1
Selection of Parameters for Limits

PLANT SITE - DU PONT CANADA INC. - CORUNNA				
ATG	PARAMETER	RMDL	UNIT	CO 0200
1	COD	10	mg/L	S
3	Hydrogen ion (pH)			****
4	Ammonia plus Ammonium	0.25	mg/L	I
4	Nitrate+Nitrite	0.25	mg/L	I
4	Total Kjeldahl Nitrogen	0.5	mg/L	I
5	DOC	0.5	mg/L	****
5	TOC	5	mg/L	S
6	Total phosphorus	0.10	mg/L	****
7	Specific conductance	5	uS/cm	S
8	Total suspended solids	5	mg/L	****
8	Volatile suspended solids	10	mg/L	S
9	Aluminum	30.0	ug/L	****
9	Copper	10.0	ug/L	I
9	Zinc	10.0	ug/L	<
14	Phenolics (4AAP)	2.0	ug/L	****
15	Sulphide	20.0	ug/L	I
16	1,1-Dichloroethane	0.8	ug/L	I
16	1,2-Dichloroethane	0.8	ug/L	I
16	Chloroform	0.7	ug/L	<
16	Chloromethane	3.7	ug/L	I
16	Methylene chloride	1.3	ug/L	<
17	Toluene	0.5	ug/L	****
23	Hexachlorobenzene	10.0	ng/L	<
23	Hexachloroethane	10.0	ng/L	<
23	Pentachlorobenzene	10.0	ng/L	<
24	PCDDs / PCDFs		pg/L	AD
25	Oil and grease	1.0	mg/L	****

SAMPLING POINT
CO 0200 - Final Effluent to River

APPENDIX A - Table A-1
Selection of Parameters for Limits

PLANT SITE - DU PONT CANADA INC. - MAITLAND					
ATG	PARAMETER	RMDL	UNIT	PR 0300	CO 0400
1	COD	10	mg/L	S	S
2	Cyanide Total	0.005	mg/L	****	NF
3	Hydrogen ion (pH)			****	****
4	Ammonia plus Ammonium	0.25	mg/L	****	NF
4	Nitrate+Nitrite	0.25	mg/L	****	NF
4	Total Kjeldahl Nitrogen	0.5	mg/L	****	NF
5	DOC	0.5	mg/L	****	****
5	TOC	5	mg/L	S	S
6	Total phosphorus	0.10	mg/L	****	****
7	Specific conductance	5	uS/cm	S	S
8	Total suspended solids	5	mg/L	****	****
8	Volatile suspended solids	10	mg/L	S	S
9	Aluminum	30.0	ug/L	I	I
9	Boron	50.0	ug/L	I	I
9	Chromium	20.0	ug/L	****	NF
9	Cobalt	20.0	ug/L	****	NF
9	Copper	10.0	ug/L	****	NF
9	Nickel	20.0	ug/L	<	NF
9	Vanadium	30.0	ug/L	****	NF
9	Zinc	10.0	ug/L	S	NF
10	Antimony	5.0	ug/L	NF	P
10	Arsenic	5.0	ug/L	NF	****
14	Phenolics (4AAP)	2.0	ug/L	****	****
15	Sulphide	20.0	ug/L	<	NF
16	1,1,2,2-Tetrachloroethane	4.3	ug/L	A	A
16	1,1,2-Trichloroethane	0.6	ug/L	A	A
16	1,1-Dichloroethane	0.8	ug/L	A	A
16	1,1-Dichloroethylene	2.8	ug/L	NF	A
16	1,2-Dichlorobenzene	1.4	ug/L	NF	A
16	1,2-Dichloroethane	0.8	ug/L	A	A
16	1,2-Dichloropropane	0.9	ug/L	A	A
16	1,3-Dichlorobenzene	1.1	ug/L	NF	A
16	1,4-Dichlorobenzene	1.7	ug/L	NF	A
16	Bromodichloromethane	0.8	ug/L	<	S
16	Bromoform	3.7	ug/L	A	A
16	Bromomethane	3.7	ug/L	A	A
16	Carbon tetrachloride	1.3	ug/L	NF	P
16	Chlorobenzene	0.7	ug/L	NF	A
16	Chloroform	0.7	ug/L	I	P
16	Chloromethane	3.7	ug/L	A	A

APPENDIX A - Table A-1
Selection of Parameters for Limits

PLANT SITE - DU PONT CANADA INC. - KINGSTON				
ATG	PARAMETER	RMDL	UNIT	PR 0600
17	Benzene	0.5	ug/L	NF
17	Ethylbenzene	0.6	ug/L	NF
17	Styrene	0.5	ug/L	NF
17	Toluene	0.5	ug/L	NF
17	o-Xylene	0.5	ug/L	NF
18	Acrolein	4.0	ug/L	NF
18	Acrylonitrile	4.2	ug/L	NF
19	Biphenyl	0.6	ug/L	****
19	Bis(2-ethylhexyl) phthalate	2.2	ug/L	NF
19	Diphenyl ether	0.4	ug/L	****
24	PCDDs / PCDFs		pg/L	P
25	Oil and grease	1.0	mg/L	****

SAMPLING POINT
PR 0600 - Flake Effluent

APPENDIX A - Table A-1
Selection of Parameters for Limits

PLANT SITE - DU PONT CANADA INC. - WHITBY				
ATG	PARAMETER	RMDL	UNIT	CO 0200
1	COD	10	mg/L	S
3	Hydrogen ion (pH)			****
4	Ammonia plus Ammonium	0.25	mg/L	<
4	Nitrate+Nitrite	0.25	mg/L	D
4	Total Kjeldahl Nitrogen	0.5	mg/L	NF
5	DOC	0.5	mg/L	****
5	TOC	5	mg/L	S
6	Total phosphorus	0.10	mg/L	****
7	Specific conductance	5	uS/cm	S
8	Total suspended solids	5	mg/L	****
8	Volatile suspended solids	10	mg/L	S
9	Aluminum	30.0	ug/L	I
9	Copper	10.0	ug/L	NF
9	Zinc	10.0	ug/L	NF
14	Phenolics (4AAP)	2.0	ug/L	****
16	Bromodichloromethane	0.8	ug/L	D
16	Chloroform	0.7	ug/L	D
16	Dibromochloromethane	1.1	ug/L	D
19	Bis(2-ethylhexyl) phthalate	2.2	ug/L	D
19	Di-n-octyl phthalate	2.0	ug/L	D
19	Diphenyl ether	0.4	ug/L	D
19	Fluoranthene	0.4	ug/L	D
25	Oil and grease	1.0	mg/L	****

SAMPLING POINT
CO 0200 - Nylon Line Combined Effluent to Creek

APPENDIX A - Table A-1
Selection of Parameters for Limits

PLANT SITE - DU PONT CANADA INC. - MAITLAND					
ATG	PARAMETER	RMDL	UNIT	PR 0300	CO 0400
16	Cis-1,3-Dichloropropylene	1.4	ug/L	A	A
16	Dibromochloromethane	1.1	ug/L	A	A
16	Ethylene dibromide	1.0	ug/L	A	A
16	Methylene chloride	1.3	ug/L	A	A
16	Tetrachloroethylene	1.1	ug/L	A	****
16	Trans-1,2-Dichloroethylene	1.4	ug/L	NF	A
16	Trans-1,3-Dichloropropylene	1.4	ug/L	A	A
16	Trichloroethylene	1.9	ug/L	NF	A
16	Trichlorofluoromethane	1.0	ug/L	P	P
16	Vinyl chloride	4.0	ug/L	A	A
17	Benzene	0.5	ug/L	<	D
17	Ethylbenzene	0.6	ug/L	A	A
17	Styrene	0.5	ug/L	A	A
17	Toluene	0.5	ug/L	A	A
17	m-Xylene and p-Xylene	1.1	ug/L	NF	A
17	o-Xylene	0.5	ug/L	S	A
18	Acrolein	4.0	ug/L	A	A
18	Acrylonitrile	4.2	ug/L	A	A
19	Diphenyl ether	0.4	ug/L	NF	NF
23	1,2,4-Trichlorobenzene	10.0	ng/L	NF	S
23	Hexachlorobenzene	10.0	ng/L	NF	****
23	Hexachlorobutadiene	10.0	ng/L	NF	S
23	Hexachloroethane	10.0	ng/L	NF	S
24	PCDDs / PCDFs	20.0	pg/L	****	P
25	Oil and grease	1.0	mg/L	****	****

SAMPLING POINTS
PR 0300 - WTP Effluent
CO 0400 - CFH Effluent

APPENDIX A - Table A-1
Selection of Parameters for Limits

PLANT SITE - ETHYL CANADA INC. - CORUNNA					
ATG	PARAMETER	RMDL	UNIT	PR 0200	PR 0300
16	Chloromethane	3.7	ug/L	P	P
16	Cis-1,3-Dichloropropylene	1.4	ug/L	A	A
16	Dibromochloromethane	1.1	ug/L	A	A
16	Ethylene dibromide	1.0	ug/L	****	****
16	Methylene chloride	1.3	ug/L	P	****
16	Tetrachloroethylene	1.1	ug/L	A	A
16	Trans-1,2-Dichloroethylene	1.4	ug/L	A	A
16	Trans-1,3-Dichloropropylene	1.4	ug/L	A	A
16	Trichloroethylene	1.9	ug/L	A	A
16	Trichlorofluoromethane	1.0	ug/L	A	A
16	Vinyl chloride	4.0	ug/L	A	A
17	Benzene	0.5	ug/L	A	A
17	Ethylbenzene	0.6	ug/L	A	A
17	Styrene	0.5	ug/L	A	A
17	Toluene	0.5	ug/L	****	****
17	m-Xylene and p-Xylene	1.1	ug/L	A	A
17	o-Xylene	0.5	ug/L	A	A
19	1-Methylnaphthalene	3.2	ug/L	NF	****
19	2-Methylnaphthalene	2.2	ug/L	NF	****
19	Acenaphthene	1.3	ug/L	NF	****
19	Benzylbutylphthalate	0.6	ug/L	NF	NF
19	Biphenyl	0.6	ug/L	NF	****
19	Fluorene	1.7	ug/L	NF	****
19	Indole	1.9	ug/L	NF	****
19	Naphthalene	1.6	ug/L	NF	****
19	Phenanthrene	0.4	ug/L	NF	****
20	Phenol	2.4	ug/L	NF	S
20	m-Cresol	3.4	ug/L	NF	S
20	o-Cresol	3.7	ug/L	NF	S
20	p-Cresol	3.5	ug/L	NF	S
25	Oil and grease	1.0	mg/L	****	****

SAMPLING POINTS
PR 0200 - Neutralization Pit Effluent (Speciality Chemicals)
PR 0300 - TEL Process Effluent

APPENDIX A - Table A-1
Selection of Parameters for Limits

PLANT SITE - ETHYL CANADA INC. - CORUNNA					
ATG	PARAMETER	RMDL	UNIT	PR 0200	PR 0300
1	COD	10	mg/L	S	S
3	Hydrogen ion (pH)			****	****
4	Ammonia plus Ammonium	0.25	mg/L	I	I
4	Nitrate+Nitrite	0.25	mg/L	****	NF
4	Total Kjeldahl Nitrogen	0.5	mg/L	<	I
5	DOC	0.5	mg/L	****	****
5	TOC	5	mg/L	S	S
6	Total phosphorus	0.10	mg/L	****	****
7	Specific conductance	5	uS/cm	S	S
8	Total suspended solids	5	mg/L	****	****
8	Volatile suspended solids	10	mg/L	S	S
9	Aluminum	30.0	ug/L	****	****
9	Boron	50.0	ug/L	NF	****
9	Chromium	20.0	ug/L	****	NF
9	Copper	10.0	ug/L	S	NF
9	Lead	30.0	ug/L	****	****
9	Nickel	20.0	ug/L	S	NF
9	Thallium	30.0	ug/L	<	NF
9	Zinc	10.0	ug/L	S	****
12	Mercury	0.10	ug/L	****	****
13	Total-alkyl Lead	2.0	ug/L	S	****
14	Phenolics (4AAP)	2.0	ug/L	****	****
15	Sulphide	20.0	ug/L	P	****
16	1,1,2,2-Tetrachloroethane	4.3	ug/L	A	A
16	1,1,2-Trichloroethane	0.6	ug/L	A	A
16	1,1-Dichloroethane	0.8	ug/L	S	S
16	1,1-Dichloroethylene	2.8	ug/L	A	A
16	1,2-Dichlorobenzene	1.4	ug/L	A	A
16	1,2-Dichloroethane	0.8	ug/L	****	****
16	1,2-Dichloropropane	0.9	ug/L	A	A
16	1,3-Dichlorobenzene	1.1	ug/L	A	A
16	1,4-Dichlorobenzene	1.7	ug/L	A	A
16	Bromodichloromethane	0.8	ug/L	A	A
16	Bromoform	3.7	ug/L	A	A
16	Bromomethane	3.7	ug/L	A	A
16	Carbon tetrachloride	1.3	ug/L	A	A
16	Chlorobenzene	0.7	ug/L	A	A
16	Chloroform	0.7	ug/L	P	S

APPENDIX A - Table A-1
Selection of Parameters for Limits

PLANT SITE - GEON CANADA INC. - THOROLD				
ATG	PARAMETER	RMDL	UNIT	PR 0100
1	COD	10	mg/L	S
2	Cyanide Total	0.005	mg/L	****
3	Hydrogen ion (pH)			****
4	Ammonia plus Ammonium	0.25	mg/L	****
4	Nitrate+Nitrite	0.25	mg/L	I
4	Total Kjeldahl Nitrogen	0.5	mg/L	****
5	DOC	0.5	mg/L	****
5	TOC	5	mg/L	S
6	Total phosphorus	0.10	mg/L	****
7	Specific conductance	5	uS/cm	S
8	Total suspended solids	5	mg/L	****
8	Volatile suspended solids	10	mg/L	S
9	Aluminum	30.0	ug/L	****
9	Boron	50.0	ug/L	I
9	Molybdenum	20.0	ug/L	<
9	Zinc	10.0	ug/L	I
11	Chromium (hexavalent)	10.0	ug/L	<
14	Phenolics (4AAP)	2.0	ug/L	****
15	Sulphide	20.0	ug/L	I
16	Chloroform	0.7	ug/L	S
16	Methylene chloride	1.3	ug/L	S
16	Trichloroethylene	1.9	ug/L	S
16	Vinyl chloride	4.0	ug/L	****
17	Toluene	0.5	ug/L	I
24	PCDDs / PCDFs	30.0	pg/L	****
25	Oil and grease	1.0	mg/L	****

SAMPLING POINT
PR 0100 - Final Effluent to River

APPENDIX A - Table A-1
Selection of Parameters for Limits

PLANT SITE - G.E. PLASTICS CANADA LTD. - COBOURG				
ATG	PARAMETER	RMDL	UNIT	CO 0100
1	COD	10	mg/L	S
2	Cyanide Total	0.005	mg/L	****
3	Hydrogen ion (pH)			****
4	Ammonia plus Ammonium	0.25	mg/L	****
4	Nitrate+Nitrite	0.25	mg/L	****
4	Total Kjeldahl Nitrogen	0.5	mg/L	****
5	DOC	0.5	mg/L	****
5	TOC	5	mg/L	S
6	Total phosphorus	0.10	mg/L	****
7	Specific conductance	5	uS/cm	S
8	Total suspended solids	5	mg/L	****
8	Volatile suspended solids	10	mg/L	S
9	Aluminum	30.0	ug/L	****
9	Cadmium	2.0	ug/L	NF
9	Zinc	10.0	ug/L	I
10	Antimony	5.0	ug/L	****
12	Mercury	0.10	ug/L	NF
14	Phenolics (4AAP)	2.0	ug/L	****
15	Sulphide	20.0	ug/L	D
17	o-Xylene	0.5	ug/L	I
24	PCDDs \ PCDFs		pg/L	AD
25	Oil and grease	1.0	mg/L	****

SAMPLING POINT
CO 0100 - Clarifier Effluent to Lake

APPENDIX A - Table A-1
Selection of Parameters for Limits

PLANT SITE - GUARDSMAN PRODUCTS LTD. - CORNWALL				
ATG	PARAMETER	RMDL	UNIT	OT 0100
1	COD	10	mg/L	S
3	Hydrogen ion (pH)			****
4	Ammonia plus Ammonium	0.25	mg/L	D
4	Nitrate + Nitrite	0.25	mg/L	D
4	Total Kjeldahl Nitrogen	0.5	mg/L	D
5	DOC	0.5	mg/L	****
5	TOC	5	mg/L	S
6	Total phosphorus	0.10	mg/L	****
7	Specific conductance	5	uS/cm	S
8	Total suspended solids	5	mg/L	****
8	Volatile suspended solids	10	mg/L	S
9	Aluminum	30.0	ug/L	I
9	Beryllium	10.0	ug/L	<
9	Cadmium	2.0	ug/L	<
9	Copper	10.0	ug/L	<
9	Molybdenum	20.0	ug/L	<
9	Zinc	10.0	ug/L	I
17	Toluene	0.5	ug/L	****
25	Oil and grease	1.0	mg/L	****

SAMPLING POINT
OT 0100 - Southeast Drain to River

APPENDIX A - Table A-1
Selection of Parameters for Limits

PLANT SITE - GOODYEAR CANADA INC. - BOWMANVILLE					
ATG	PARAMETER	RMDL	UNIT	0600	0800
3	Hydrogen ion (pH)			****	****
5	DOC*	0.5	mg/L	****	****
6	Total phosphorus*	0.10	mg/L	****	****
8	Total suspended solids*	5	mg/L	****	****
9	Aluminum*	30.0	ug/L	****	****
9	Zinc*	10.0	ug/L	NF	****
14	Phenolics (4AAP)*	2.0	ug/L	****	****
15	Sulphide*	20.0	ug/L	****	****
25	Oil and grease*	1.0	mg/L	****	****

* - Parameters specified for limits on the basis of MISA Inspection Data and raw material usage.

SAMPLING POINTS
0600 - Outfall (H) to Lake Ontario
0800 - Outfall (K) to Lake Ontario

APPENDIX A - Table A-1
Selection of Parameters for Limits

PLANT SITE - MORBERN INC. - CORNWALL				
ATG	PARAMETER	RMDL	UNIT	OT 0100
1	COD	10	mg/L	S
3	Hydrogen ion (pH)			****
4	Ammonia plus Ammonium	0.25	mg/L	D
4	Nitrate + Nitrite	0.25	mg/L	D
4	Total Kjeldahl Nitrogen	0.5	mg/L	D
5	DOC	0.5	mg/L	****
5	TOC	5	mg/L	S
6	Total phosphorus	0.10	mg/L	****
7	Specific conductance	5	uS/cm	S
8	Total suspended solids	5	mg/L	****
8	Volatile suspended solids	10	mg/L	S
9	Aluminum	30.0	ug/L	****
9	Boron	50.0	ug/L	<
9	Copper	10.0	ug/L	I
9	Zinc	10.0	ug/L	****
14	Phenolics (4AAP)	2.0	ug/L	****
16	1,2-Dichloroethane	0.8	ug/L	<
16	Bromodichloromethane	0.8	ug/L	I
16	Bromomethane	3.7	ug/L	<
16	Chloroform	0.7	ug/L	I
16	Dibromochloromethane	1.1	ug/L	I
17	Benzene	0.5	ug/L	I
17	Toluene	0.5	ug/L	I
17	o-Xylene	0.5	ug/L	I
25	Oil and grease	1.0	mg/L	****

SAMPLING POINT
OT 0100 - East Cooling Water to River

APPENDIX A - Table A-1
Selection of Parameters for Limits

PLANT SITE - IMPERIAL OIL CHEMICALS DIVISION - SARNIA				
ATG	PARAMETER	RMDL	UNIT	CO 0300
1	COD	10	mg/L	S
2	Cyanide Total	0.005	mg/L	D
3	Hydrogen ion (pH)			****
4	Ammonia plus Ammonium	0.25	mg/L	NF
4	Nitrate+Nitrite	0.25	mg/L	NF
4	Total Kjeldahl Nitrogen	0.5	mg/L	NF
5	DOC	0.5	mg/L	****
5	TOC	5	mg/L	S
6	Total phosphorus	0.10	mg/L	****
7	Specific conductance	5	uS/cm	S
8	Total suspended solids	5	mg/L	****
8	Volatile suspended solids	10	mg/L	S
9	Aluminum	30.0	ug/L	I
9	Copper	10.0	ug/L	I
9	Zinc	10.0	ug/L	I
14	Phenolics (4AAP)	2.0	ug/L	****
16	Bromodichloromethane	0.8	ug/L	<
16	Chloroform	0.7	ug/L	S
16	Tetrachloroethylene	1.1	ug/L	NF
16	Vinyl chloride	4.0	ug/L	****
17	Benzene	0.5	ug/L	****
17	Toluene	0.5	ug/L	****
17	m-Xylene and p-Xylene	1.1	ug/L	S
17	o-Xylene	0.5	ug/L	S
19	Bis(2-ethylhexyl) phthalate	2.2	ug/L	I
23	Hexachlorobutadiene	10.0	ng/L	****
23	Hexachloroethane	10.0	ng/L	S
25	Oil and grease	1.0	mg/L	****

SAMPLING POINTS:
CO 0300 - Effluent to River

APPENDIX A - Table A-1
Selection of Parameters for Limits

PLANT SITE - OXYCHEM DUREZ CANADA - FORT ERIE				
ATG	PARAMETER	RMDL	UNIT	OT 0100
1	COD	10	mg/L	S
3	Hydrogen ion (pH)			****
4	Ammonia plus Ammonium	0.25	mg/L	<
4	Nitrate + Nitrite	0.25	mg/L	D
4	Total Kjeldahl Nitrogen	0.5	mg/L	<
5	DOC	0.5	mg/L	****
5	TOC	5	mg/L	S
6	Total phosphorus	0.10	mg/L	****
7	Specific conductance	5	uS/cm	S
8	Total suspended solids	5	mg/L	****
8	Volatile suspended solids	10	mg/L	S
9	Aluminum	30.0	ug/L	I
9	Chromium	20.0	ug/L	****
9	Zinc	10.0	ug/L	****
14	Phenolics (4AAP)	2.0	ug/L	****
25	Oil and grease	1.0	mg/L	****

Process Changes - stream diverted to Municipal Treatment System

SAMPLING POINT
OT 0100 - Final Effluent to River

APPENDIX A - Table A-1
Selection of Parameters for Limits

PLANT SITE - NOVACOR CHEMICALS LTD. - MOORETOWN				
ATG	PARAMETER	RMDL	UNIT	CO 0100
1	COD	10	mg/L	S
3	Hydrogen ion (pH)			****
4	Ammonia plus Ammonium	0.25	mg/L	I
4	Nitrate+Nitrite	0.25	mg/L	I
4	Total Kjeldahl Nitrogen	0.5	mg/L	I
5	DOC	0.5	mg/L	****
5	TOC	5	mg/L	S
6	Total phosphorus	0.10	mg/L	****
7	Specific conductance	5	uS/cm	S
8	Total suspended solids	5	mg/L	****
8	Volatile suspended solids	10	mg/L	S
9	Aluminum	30.0	ug/L	****
9	Zinc	10.0	ug/L	****
14	Phenolics (4AAP)	2.0	ug/L	****
15	Sulphide	20.0	ug/L	I
16	Bromodichloromethane	0.8	ug/L	I
16	Chloroform	0.7	ug/L	I
16	Dibromochloromethane	1.1	ug/L	I
19	Bis(2-ethylhexyl) phthalate	2.2	ug/L	<
25	Oil and grease	1.0	mg/L	****

SAMPLING POINT
CO 0100 - Final Effluent to River

APPENDIX A - Table A-1
Selection of Parameters for Limits

PLANT SITE - POLYSAR LTD. - SARNIA							
ATG	PARAMETER	RMDL	UNIT	PR 0900	PR 1300	BA 1700	PR 1800
16	Trans-1,2-Dichloroethylene	1.4	ug/L	A	NF	NF	NF
16	Trans-1,3-Dichloropropylene	1.4	ug/L	A	NF	NF	NF
16	Trichloroethylene	1.9	ug/L	A	NF	NF	NF
16	Trichlorofluoromethane	1.0	ug/L	A	NF	NF	NF
16	Vinyl chloride	4.0	ug/L	A	NF	NF	NF
17	Benzene	0.5	ug/L	****	NF	<	****
17	Ethylbenzene	0.6	ug/L	A	NF	I	NF
17	Styrene	0.5	ug/L	A	NF	NF	NF
17	Toluene	0.5	ug/L	S	NF	NF	S
17	m-Xylene and p-Xylene	1.1	ug/L	A	NF	NF	NF
17	o-Xylene	0.5	ug/L	A	NF	NF	NF
18	Acrolein	4.0	ug/L	A	NF	NF	NF
18	Acrylonitrile	4.2	ug/L	A	NF	NF	NF
19	Bis(2-ethylhexyl) phthalate	2.2	ug/L	NF	NF	D	S
20	2,6-Dichlorophenol	2.0	ug/L	NF	NF	S	NF
23	1,2,4-Trichlorobenzene	10.0	ng/L	NF	NF	NF	NF
23	2,4,5-Trichlorotoluene	10.0	ng/L	NF	NF	NF	NF
23	Hexachlorobenzene	10.0	ng/L	NF	NF	NF	NF
23	Hexachlorobutadiene	10.0	ng/L	NF	NF	NF	NF
23	Hexachloroethane	10.0	ng/L	NF	NF	NF	NF
23	Octachlorostyrene	10.0	ng/L	NF	NF	NF	NF
23	Pentachlorobenzene	10.0	ng/L	NF	NF	NF	NF
25	Oil and grease	1.0	mg/L	****	****	****	****

SAMPLING POINTS
PR 0900 - Butyl II Effluent
PR 1300 - Butyl Holdup Pond to River
BA 1700 - Neutralization Sump to River
PR 1800 - Biox Effluent to River

APPENDIX A - Table A-1
Selection of Parameters for Limits

PLANT SITE - POLYSAR LTD. - SARNIA							
ATG	PARAMETER	RMDL	UNIT	PR 0900	PR 1300	BA 1700	PR 1800
1	COD	10	mg/L	S	S	S	S
3	Hydrogen ion (pH)			****	****	****	****
4	Ammonia plus Ammonium	0.25	mg/L	NF	NF	S	****
4	Nitrate+Nitrite	0.25	mg/L	NF	NF	S	****
4	Total Kjeldahl Nitrogen	0.5	mg/L	I	NF	****	****
5	DOC	0.5	mg/L	****	****	****	****
5	TOC	5	mg/L	S	S	S	S
6	Total phosphorus	0.10	mg/L	****	****	****	****
7	Specific conductance	5	uS/cm	S	S	S	S
8	Total suspended solids	5	mg/L	****	****	****	****
8	Volatile suspended solids	10	mg/L	S	S	S	S
9	Aluminum	30.0	ug/L	****	****	****	****
9	Boron	50.0	ug/L	I	<	<	NF
9	Cobalt	20.0	ug/L	NF	<	NF	****
9	Molybdenum	20.0	ug/L	NF	NF	NF	S
9	Nickel	20.0	ug/L	NF	NF	NF	S
9	Zinc	10.0	ug/L	****	****	****	****
10	Antimony	5.0	ug/L	I	<	D	I
11	Chromium (hexavalent)	10.0	ug/L	I	NF	D	D
14	Phenolics (4AAP)	2.0	ug/L	****	****	****	****
15	Sulphide	20.0	ug/L	D	NF	I	D
16	1,1,2,2-Tetrachloroethane	4.3	ug/L	A	NF	NF	NF
16	1,1,2-Trichloroethane	0.6	ug/L	A	NF	NF	NF
16	1,1-Dichloroethane	0.8	ug/L	A	NF	NF	NF
16	1,1-Dichloroethylene	2.8	ug/L	A	NF	NF	NF
16	1,2-Dichlorobenzene	1.4	ug/L	A	NF	NF	NF
16	1,2-Dichloroethane	0.8	ug/L	A	NF	NF	NF
16	1,2-Dichloropropane	0.9	ug/L	A	NF	NF	NF
16	1,3-Dichlorobenzene	1.1	ug/L	A	NF	NF	NF
16	1,4-Dichlorobenzene	1.7	ug/L	A	NF	NF	NF
16	Bromodichloromethane	0.8	ug/L	A	NF	NF	NF
16	Bromoform	3.7	ug/L	A	NF	NF	****
16	Bromomethane	3.7	ug/L	****	S	NF	NF
16	Carbon tetrachloride	1.3	ug/L	A	NF	NF	NF
16	Chlorobenzene	0.7	ug/L	A	NF	NF	NF
16	Chloroform	0.7	ug/L	****	NF	NF	****
16	Chloromethane	3.7	ug/L	****	****	NF	****
16	Cis-1,3-Dichloropropylene	1.4	ug/L	A	NF	NF	NF
16	Dibromochloromethane	1.1	ug/L	S	NF	NF	NF
16	Ethylene dibromide	1.0	ug/L	A	NF	NF	NF
16	Methylene chloride	1.3	ug/L	****	NF	NF	NF
16	Tetrachloroethylene	1.1	ug/L	A	NF	NF	NF

APPENDIX A - Table A-1
Selection of Parameters for Limits

PLANT SITE - STEPAN CANADA INC. - LONGFORD MILLS				
ATG	PARAMETER	RMDL	UNIT	PR 0200
1	COD	10	mg/L	S
3	Hydrogen ion (pH)			****
4	Ammonia plus Ammonium	0.25	mg/L	****
4	Nitrate+Nitrite	0.25	mg/L	<
4	Total Kjeldahl Nitrogen	0.5	mg/L	****
5	DOC	0.5	mg/L	****
5	TOC	5	mg/L	S
6	Total phosphorus	0.10	mg/L	****
7	Specific conductance	5	uS/cm	S
8	Total suspended solids	5	mg/L	****
8	Volatile suspended solids	10	mg/L	S
9	Aluminum	30.0	ug/L	****
9	Boron	50.0	ug/L	I
9	Copper	10.0	ug/L	<
9	Nickel	20.0	ug/L	<
9	Zinc	10.0	ug/L	I
11	Chromium (hexavalent)	10.0	ug/L	<
14	Phenolics (4AAP)	2.0	ug/L	****
15	Sulphide	20.0	ug/L	I
16	Carbon tetrachloride	1.3	ug/L	****
16	Chloroform	0.7	ug/L	****
25	Oil and grease	1.0	mg/L	****
27	PCBT	0.1	ug/L	****

SAMPLING POINT
PR 0200 - Clarifier Effluent

APPENDIX A - Table A-1
Selection of Parameters for Limits

PLANT SITE - ROHM AND HAAS CANADA INC. - MORRISBURG				
ATG	PARAMETER	RMDL	UNIT	CO 0100
1	COD	10	mg/L	S
2	Cyanide Total	0.005	mg/L	<
3	Hydrogen ion (pH)			****
4	Ammonia plus Ammonium	0.25	mg/L	I
4	Nitrate+Nitrite	0.25	mg/L	<
4	Total Kjeldahl Nitrogen	0.5	mg/L	I
5	DOC	0.5	mg/L	****
5	TOC	5	mg/L	S
6	Total phosphorus	0.10	mg/L	****
7	Specific conductance	5	uS/cm	S
8	Total suspended solids	5	mg/L	****
8	Volatile suspended solids	10	mg/L	S
9	Aluminum	30.0	ug/L	<
9	Copper	10.0	ug/L	<
9	Zinc	10.0	ug/L	<
14	Phenolics (4AAP)	2.0	ug/L	****
15	Sulphide	20.0	ug/L	I
16	Bromodichloromethane	0.8	ug/L	I
16	Chloroform	0.7	ug/L	I
16	Dibromochloromethane	1.1	ug/L	I
17	Ethylbenzene	0.6	ug/L	NF
17	Toluene	0.5	ug/L	****
17	m-Xylene and p-Xylene	1.1	ug/L	NF
17	o-Xylene	0.5	ug/L	NF
24	PCDDs \ PCDFs		pg/L	AD
25	Oil and grease	1.0	mg/L	****

SAMPLING POINT
CO 0100 - Final Outfall to River

APPENDIX B

SUMMARY OF CURRENT (1989-90 MONITORING DATA) VERSUS BAT 2 PERFORMANCE DATA FOR THE OCM SECTOR

KEY TO ABBREVIATIONS

ATG = Analytical Test Group

RMDL = Regulation Method Detection Limit

UNIT = mg/L = milligrams/litre; μg/L = micrograms/litre

CLTA = concentration - long term average

LLTA = loading - long term average

Freq = monitoring frequency D = daily; W = weekly; Q = quarterly

LVF1 = loading variability factor - based on daily loading and 99th percentile value

LVFM = loading variability factor - based on 95th percentile values of 4 or 30 day means

BDL = daily loading limit (kg/day)

BML = monthly loading limit (kg/day) - average of weekly or daily values

BDC = concentration equivalent of daily loading limit = BDL/(Avg. Flow)

BMC = concentration equivalent of monthly loading limit = BML/(Avg. Flow)

NAT = No Additional Treatment

BMP = Best Management Practice

API = American Petroleum Institute Oil Separator

BFP = Belt Filter Press

BIO = Biological Treatment

BTU = Biological Treatment Upgrading

CLAR = Clarification

CP = Chemical Precipitation

SUMMARY OF CURRENT (1989-90 MONITORING DATA) VERSUS BAT 2 PERFORMANCE DATA FOR THE OCM SECTOR (cont'd)

KEY TO ABBREVIATIONS

EQUAL = Equalization

FIL = Filtration

GAC = Granular Actvated Carbon

NEU = Neutralization

SLUDGE = Sludge Drawoff and Disposal

SS = Solids Settling

Footnotes under BDC or BMC refer to limit based on a minimum RMDL multiple of 4xRMDL for BDC and 2xRMDL for BMC

Appendix B

Current Performance (1989–90 Monitoring Data) versus BAT #2 Performance for the OCM Sector

Plant Site / Control Point – Amoco Canada Resources Ltd. 0100

				CURRENT		BAT # 2 PERFORMANCE – BMP / GAC / FIL								
ATG	PARAMETER	RMDL	UNIT	CLTA	LLTA	Freq.	CLTA	LLTA	LVF1	LVFM	BDL	BML	BDC	BMC
5	DOC	0.5	mg/L	20.7	7.31	D	4.4	1.66	5.44	1.79	9.02	2.97	23.9	7.88
6	Total phosphorus	0.1	mg/L	0.855	0.292	W	0.855	0.292	4.14	1.4	1.21	0.41	3.21	1.1
8	Total suspended solids	5	mg/L	22.6	12.3	D	6	2.3	7.3	1.6	16.8	3.7	45	10
9	Aluminum	30	ug/L	415	0.246	Q	415	0.246	4.5	–	1.11	–	2936	–
9	Copper	10	ug/L	46.6	0.0208	Q	46.6	0.021	10	–	0.21	–	557	–
9	Molybdenum	20	ug/L	496	0.166	W	248	0.083	4.57	1.87	0.38	0.16	1008	412
9	Zinc	10	ug/L	46	0.0204	Q	46	0.02	8.56	–	0.171	–	454	–
10	Arsenic	5	ug/L	9.75	0.004	Q	9.75	0.004	2.78	–	0.0111	–	29.5	–
12	Mercury	0.1	ug/L	0.493	0.0002	Q	0.49	0.0002	5.11	–	0.00102	–	2.71	–
14	Phenolics (4AAP)	2	ug/L	8.76	0.0034	W	2.5	0.00094	7.07	2.43	0.00665	0.00228	17.6	6.06
15	Sulphide	20	ug/L	64.5	0.0195	W	64.5	0.0195	6.25	2.23	0.122	0.0435	323	115
16	1,2–Dichlorobenzene	1.4	ug/L	60.5	0.0247	W	60.5	0.0247	6.31	2.26	0.156	0.0558	413	148
17	Benzene	0.5	ug/L	40.2	0.0106	W	3.4	0.00128	10	3.96	0.0128	0.00507	33.9	13.4
25	Oil and grease	1	mg/L	4.05	1.76	W	4.1	1.76	3.4	2.67	6	4.7	15.9	12.5

Plant Site / Control Point – BASF Canada Inc. (Sarnia) 0100 **

				CURRENT		BAT # 2 PERFORMANCE – BMP / SS								
ATG	PARAMETER	RMDL	UNIT	CLTA	LLTA	Freq.	CLTA	LLTA	LVF1	LVFM	BDL	BML	BDC	BMC
5	DOC	0.5	mg/L	1.89	17.9	W	1.89	17.9	2.87	1.5	51.4	26.9	5.48	2.86
6	Total phosphorus	0.1	mg/L	0.092	0.879	Q	0.092	0.879	4.32	1.74	3.79	–	0.4*	–
8	Total suspended solids	5	mg/L	4.92	46.7	D	4.92	46.7	4.06	1.74	190	93.9	20.2	10*
14	Phenolics (4AAP)	2	ug/L	2.33	0.0227	W	2.33	0.023	3.38	1.81	0.0777	0.0416	8.29	4.44
17	Styrene	0.5	ug/L	71.1	0.511	D	16	0.15	3.38	1.81	0.507	0.272	54.1	28.9
18	Acrylonitrile	4.2	ug/L	3940	29.7	D	50	0.469	4.82	2.41	2.26	1.13	241	120
25	Oil and grease	1	mg/L	1.23	11	W	1.2	11	2.41	1.32	37.5	18.7	4.0*	2.0*

** – Process Changes – stream 0100 classified as Cooling Water

Appendix B Current Performance (1989–90 Monitoring Data) versus BAT #2 Performance for the OCM Sector

Plant Site / Control Point – Celanese Canada Inc. 0400

				CURRENT			BAT # 2	PERFORMANCE – NAT						
ATG	PARAMETER	RMDL	UNIT	CLTA	LLTA	Freq.	CLTA	LLTA	LVF1	LVFM	BDL	BML	BDC	BMC
4	Ammonia plus Ammonium	0.25	mg/L	1.28	5.49	W	1.28	5.49	10	3.64	54.9	20	13.6	5
4	Nitrate + Nitrite	0.25	mg/L	2.81	10.8	W	2.81	10.8	10	3.76	108	40.6	26.9	10.1
4	Total Kjeldahl nitrogen	0.5	mg/L	2.31	9.71	D	2.31	9.71	5.6	1.6	54.4	15.5	13.5	3.9
5	DOC	0.5	mg/L	6.69	26.8	D	6.69	26.8	2.11	1.14	56.5	30.6	14.1	7.6
6	Total phosphorus	0.1	mg/L	1.13	4.4	W	1	3.9	5.92	2.17	23.1	8.5	5.7	2.1
8	Total suspended solids	5	mg/L	7.47	30.7	D	7.47	30.7	4.23	1.26	130	38.7	32.3	9.62
10	Antimony	5	ug/L	71.3	0.239	W	71.3	0.239	6.12	2.23	1.46	0.533	364	133
14	Phenolics (4AAP)	2	ug/L	0.79	0.0032	W	0.79	0.003	4.09	1.7	0.0322	0.008	8*	2*
25	Oil and grease	1	mg/L	1.36	5.57	W	1.36	5.57	7.47	2.54	41.6	14.1	10.4	3.52

Plant Site / Control Point – Chinook Group Limited 0100

				CURRENT			BAT # 2	PERFORMANCE – BIO						
ATG	PARAMETER	RMDL	UNIT	CLTA	LLTA	Freq.	CLTA	LLTA	LVF1	LVFM	BDL	BML	BDC	BMC
4	Ammonia plus Ammonium	0.25	mg/L	1.63	0.173	W	1.63	0.173	8.44	2.75	1.46	0.48	10.9	3.6
4	Total Kjeldahl nitrogen	0.5	mg/L	17.8	2.39	D	2.3	0.308	10	3.41	3.1	1.05	23	7.84
5	DOC	0.5	mg/L	77	11	D	16.7	2.24	3.68	1.43	8.2	3.2	61	23.9
6	Total phosphorus	0.1	mg/L	4.36	0.456	W	0.71	0.095	5.49	2.09	0.52	0.2	3.9	1.5
8	Total suspended solids	5	mg/L	14.9	1.77	D	14.9	1.77	4.25	1.37	7.5	2.4	56	17.9
9	Chromium	20	ug/L	93.5	0.0073	W	50	0.0039	5.31	2.03	0.021	0.0079	157	58.9
9	Zinc	10	ug/L	137	0.0095	W	137	0.0095	6.99	2.41	0.0664	0.0229	496	171
25	Oil and grease	1	mg/L	1.58	0.181	W	1.58	0.181	4.97	1.9	0.9	0.344	6.71	2.57

Plant Site / Control Point – Cornwall Chemicals Ltd. 0100

				CURRENT			BAT #2	PERFORMANCE – STEAM STRIPPING						
ATG	PARAMETER	RMDL	UNIT	CLTA	LLTA	Freq.	CLTA	LLTA	LVF1	LVFM	BDL	BML	BDC	BMC
5	DOC	0.5	mg/L	5.9	3.89	D	5.9	3.89	2.67	1.2	10.4	4.65	15.8	7.08
6	Total phosphorus	0.1	mg/L	0.166	0.106	Q	0.166	0.106	6.02	–	0.64	–	0.974	–
8	Total suspended solids	5	mg/L	18.8	11.9	D	15	9.5	4.25	1.37	40.4	13	62	20*
9	Aluminum	30	ug/L	382	0.225	Q	382	0.225	3.66	1.67	0.825	–	1260	–
9	Nickel	20	ug/L	166	0.088	Q	166	0.088	10	–	0.88	–	1344	–
9	Zinc	10	ug/L	118	0.08	Q	118	0.08	6.18	–	0.495	–	756	–
12	Mercury	0.1	ug/L	3.06	0.002	W	1	0.000655	6.42	2.28	0.00421	0.00149	6.42	2.28
15	Sulphide	20	ug/L	5300	3.56	D	200	0.131	10	4.03	1.3	0.528	1985	806
16	Carbon tetrachloride	1.3	ug/L	16900	11.4	D	7	0.00459	9.08	2.38	0.0416	0.0109	63.6	16.7
23	Hexachloroethane	10	ng/L	542	0.0004	W	542	0.000355	7.53	2.53	0.00267	0.00084	4080	1370
25	Oil and grease	1	mg/L	4.74	3.2	W	4.1	2.8	3.1	1.6	8.7	4.5	13.3	6.9

Current Performance (1989–90 Monitoring Data) versus BAT #2 Performance for the OCM Sector

Plant Site / Control Point – Dow Chemical Canada Inc. 1700

				CURRENT		BAT #2	PERFORMANCE – SS/FIL/CP							
ATG	PARAMETER	RMDL	UNIT	CLTA	LLTA	Freq.	CLTA	LLTA	LVF1	LVFM	BDL	BML	BDC	BMC
5	DOC	0.5	mg/L	7.66	8.44	D	7.66	8.44	3.76	1.26	31.7	10.6	28.8	9.67
6	Total phosphorus	0.1	mg/L	0.103	0.117	W	0.103	0.117	10.3	3.07	1.21	0.36	1.1	0.33
8	Total suspended solids	5	mg/L	22.6	24.6	D	5	5.5	4.24	1.33	23.3	12.8	21.2	10*
9	Aluminum	30	ug/L	130	0.147	W	47	0.052	7.36	2.48	0.383	0.129	3487	117
14	Phenolics (4AAP)	2	ug/L	8.13	0.0087	W	8.1	0.009	3.67	1.7	0.033	0.0153	30	13.9
16	1,2–Dichloroethane	0.8	ug/L	1070	1.15	W	73.3	0.081	6.27	2.25	0.508	0.182	462	166
16	Methylene chloride	1.3	ug/L	42.2	0.0483	Q	10	0.011	8.09	–	0.089	–	80.9	–
16	Tetrachloroethylene	1.1	ug/L	73.5	0.0817	W	18.4	0.02	5.33	2.04	0.107	0.0408	97.2	37
16	Trichloroethylene	1.9	ug/L	27.6	0.0297	Q	10	0.011	5.01	–	0.0551	–	50.1	–
16	Vinyl chloride	4	ug/L	47.2	0.0578	Q	47.2	0.0578	10	–	0.58	–	527	–
23	1,2,4–Trichlorobenzene	10	ng/L	1970	0.0022	W	1970	0.0022	7.61	2.54	0.0167	0.00559	15200	5080
23	2,4,5–Trichlorotoluene	10	ng/L	857	0.0009	W	857	0.0009	4.05	1.83	0.00365	0.0016	3310	1400
23	Hexachlorobenzene	10	ng/L	723	0.0008	Q	723	0.0008	3.74	–	0.00299	–	2720	–
23	Hexachloroethane	10	ng/L	155	0.0002	W	155	0.0002	2.61	1.64	0.000522	0.00033	475	300
25	Oil and grease	1	mg/L	1.43	1.57	W	1.4	1.57	4.08	1.74	6.41	2.73	5.82	2.48

Plant Site / Control Point – Dow Chemical Canada Inc. 1900

				CURRENT		BAT #2	PERFORMANCE – NAT							
ATG	PARAMETER	RMDL	UNIT	CLTA	LLTA	Freq.	CLTA	LLTA	LVF1	LVFM	BDL	BML	BDC	BMC
4	Ammonia plus Ammonium	0.25	mg/L	2.87	28.3	W	1.57	13.6	10	3.19	136	43.4	15.7	5
4	Total Kjeldahl nitrogen	0.5	mg/L	1.51	13.1	D	1.51	13.1	5.97	1.66	78.2	21.7	9.04	2.51
5	DOC	0.5	mg/L	4.94	43.6	D	4.94	43.6	3.24	1.3	141	56.7	16.3	6.55
6	Total phosphorus	0.1	mg/L	0.288	2.65	W	0.288	2.65	7.12	2.43	18.9	6.44	2.18	0.744
8	Total suspended solids	5	mg/L	34.1	304	D	15	130	4.09	1.56	531	202	61.4	23.4
9	Aluminum	30	ug/L	416	3.67	W	416	3.67	6.66	2.34	24.4	8.59	2830	993
14	Phenolics (4AAP)	2	ug/L	32.1	0.297	W	10.1	0.087	9.78	3.06	0.851	0.266	98.4	30.8
16	1,2–Dichloropropane	0.9	ug/L	26.8	0.215	W	26.8	0.215	8.93	2.87	1.92	0.617	222	71.3
17	Ethylbenzene	0.6	ug/L	0.838	0.0077	Q	0.838	0.0077	7.2	–	0.0554	–	6.41	–
19	Bis(2–chloroisopropyl)ether	2.2	ug/L	66.6	0.564	Q	2	0.0173	1.91	–	0.076	–	8.8*	–
23	1,2,4,5–Tetrachlorobenzene	10	ng/L	25.3	0.0002	W	25.3	0.0002	10	3.77	0.002	0.000754	200	87.2
25	Oil and grease	1	mg/L	4.69	37.9	W	4.69	37.9	4.52	1.87	171	70.9	19.8	8.19

Plant Site / Control Point – Dow Chemical Canada Inc. 2000

				CURRENT		BAT #2	PERFORMANCE – NAT							
ATG	PARAMETER	RMDL	UNIT	CLTA	LLTA	Freq.	CLTA	LLTA	LVF1	LVFM	BDL	BML	BDC	BMC
4	Nitrate + Nitrite	0.25	mg/L	1.56	1.79	W	1.56	1.79	6.06	2.2	10.8	3.94	10.4	3.79
5	DOC	0.5	mg/L	3.91	4.17	D	3.91	4.17	3.91	1.25	16.3	5.21	15.7	5.01
6	Total phosphorus	0.1	mg/L	0.078	0.0785	W	0.078	0.079	6.87	2.4	0.543	0.19	0.522	0.18
8	Total suspended solids	5	mg/L	11.2	12.5	D	11.2	12.5	6.56	1.51	82	18.9	78.8	18.1
9	Aluminum	30	ug/L	68.3	0.078	W	68.3	0.078	4.52	1.89	0.353	0.147	339	142
14	Phenolics (4AAP)	2	ug/L	20.6	0.024	W	10	0.01	5.55	2.09	0.056	0.021	54	20
25	Oil and grease	1	mg/L	1.34	1.51	W	1.34	1.51	4.79	1.86	7.23	2.81	6.95	2.7

Appendix B Current Performance (1989–90 Monitoring Data) versus BAT #2 Performance for the OCM Sector

Plant Site / Control Point – Dow Chemical Canada Inc. 2100

				CURRENT		BAT # 2	PERFORMANCE – BMP / API							
ATG	PARAMETER	RMDL	UNIT	CLTA	LLTA	Freq.	CLTA	LLTA	LVF1	LVFM	BDL	BML	BDC	BMC
4	Total Kjeldahl Nitrogen	0.5	mg/L	2.99	0.294	W	2.99	0.294	5.65	2.11	1.66	0.62	12.8	4.77
5	DOC	0.5	mg/L	22.4	2.91	D	22.4	2.91	9.22	2.09	26.8	6.08	206	46.8
6	Total phosphorus	0.1	mg/L	0.269	0.0243	W	0.269	0.0243	5.86	2.17	0.142	0.053	1.1	0.4
8	Total suspended solids	5	mg/L	4.82	0.643	W	4.82	0.643	3.15	1.57	2.6	1.28	20*	10*
9	Aluminum	30	ug/L	66.2	0.0073	Q	66.2	0.0073	3	1.57	0.0219	–	168	–
9	Boron	50	ug/L	3410	0.395	Q	3410	0.395	4.41	1.84	1.74	–	13400	–
12	Mercury	0.1	ug/L	0.126	–	Q	0.126	0.00002	2.12	1.35	0.0000424	–	0.326	–
14	Phenolics (4AAP)	2	ug/L	9.65	0.0011	W	9.65	0.0011	5.67	2.11	0.00624	0.00232	48	17.9
15	Sulphide	20	ug/L	62.5	0.0043	Q	62.5	0.0043	1.69	–	0.01	–	80*	–
16	1,1,2–Trichloroethane	0.6	ug/L	15.6	0.0021	W	15.6	0.0021	10	3.1	0.021	0.0065	162	50
16	1,1–Dichloroethane	0.8	ug/L	38.7	0.0047	W	38.7	0.0047	10	3.25	0.047	0.0153	362	118
23	1,2,4–Trichlorobenzene	10	ng/L	1670	0.0003	W	1670	0.0003	10	3.77	0.003	0.00113	23000	8700
23	2,4,5–Trichlorotoluene	10	ng/L	398	0.0001	W	398	0.0001	4.26	2	0.000426	0.0002	3280	1530
23	Hexachlorobenzene	10	ng/L	42.8	–	Q	42.8	0.00001	10	–	0.0001	–	700	–
23	Hexachlorobutadiene	10	ng/L	417	0.0001	W	417	0.0001	2.79	1.6	0.000279	0.0002	2150	1231
23	Hexachloroethane	10	ng/L	394	0.0001	W	394	0.0001	2.78	1.6	0.000278	0.0002	2140	1231
23	Octachlorostyrene	10	ng/L	735	0.0001	W	735	0.0001	2.09	1.95	0.000209	0.0002	1610	1500
25	Oil and grease	1	mg/L	46.1	5.89	W	4.1	0.533	3.4	2.7	1.8	1.44	14	11

Plant Site / Control Point – Du Pont Canada Inc. (Corunna) 0200

				CURRENT		BAT #2	PERFORMANCE – NAT							
ATG	PARAMETER	RMDL	UNIT	CLTA	LLTA	Freq.	CLTA	LLTA	LVF1	LVFM	BDL	BML	BDC	BMC
5	DOC	0.5	mg/L	2.95	153	W	2.95	153	3.08	1.55	438	220	8	4
6	Total phosphorus	0.1	mg/L	0.077	4.21	Q	0.077	4.21	2.86	–	21.8	–	0.4*	–
8	Total suspended solids	5	mg/L	6.65	351	W	6.65	351	3.61	1.62	1270	569	23.2	10.4
9	Aluminum	30	ug/L	221	12.6	Q	221	12.6	3.59	1.66	45.1	–	825	–
14	Phenolics (4AAP)	2	ug/L	2.7	0.136	W	2.7	0.136	3.81	1.72	0.554	0.249	10.1	4.5
17	Toluene	0.5	ug/L	3.05	0.171	Q	3.05	0.171	7.51	2.52	1.28	–	23.4	–
25	Oil and grease	1	mg/L	1.34	71.4	W	1.34	71.4	6.44	2.31	460	165	8.4	3

Plant Site / Control Point – Du Pont Canada Inc. (Kingston) 0600

				CURRENT		BAT # 2	PERFORMANCE – BMP							
ATG	PARAMETER	RMDL	UNIT	CLTA	LLTA	Freq.	CLTA	LLTA	LVF1	LVFM	BDL	BML	BDC	BMC
5	DOC	0.5	mg/L	4.98	4.45	D	4.98	4.45	5.61	1.27	25	5.65	28	6.34
6	Total phosphorus	0.1	mg/L	0.218	0.14	W	0.218	0.14	9.18	3.02	1.29	0.423	1.44	0.474
8	Total suspended solids	5	mg/L	10.6	9.57	D	10.6	9.57	9.73	1.93	93.1	18.5	104	20.7
12	Mercury	0.1	ug/L	0.165	0.0001	Q	0.165	0.0001	2.34	–	0.00036	–	0.4*	–
14	Phenolics (4AAP)	2	ug/L	1.15	0.001	W	1.15	0.001	4.74	1.84	0.0072	0.0035	8*	4*
19	Biphenyl	0.6	ug/L	4.55	0.0046	Q	4.55	0.0046	2.99	1.52	0.0138	–	15.4	–
19	Diphenyl ether	0.4	ug/L	14.6	0.0153	W	14.6	0.0153	4.66	1.89	0.0713	0.0289	79.9	32.4
25	Oil and grease	1	mg/L	1.41	1.29	W	1.41	1.29	5.82	2.23	7.51	2.88	8.42	3.23

Appendix B

Current Performance (1989–90 Monitoring Data) versus BAT #2 Performance for the OCM Sector

Plant Site / Control Point – Du Pont Canada Inc. (Maitland) 0300

				CURRENT		BAT #2	PERFORMANCE – CP / SS / CLAR / SLUDGE							
ATG	PARAMETER	RMDL	UNIT	CLTA	LLTA	Freq.	CLTA	LLTA	LVF1	LVFM	BDL	BML	BDC	BMC
2	Cyanide Total	0.005	mg/L	0.207	1.05	W	0.207	1.05	5.22	2.02	5.48	2.1	1.12	0.43
4	Ammonia plus Ammonium	0.25	mg/L	23.8	112	W	1.8	19.2	7.3	2.5	140	48	13	4.4
4	Nitrate + Nitrite	0.25	mg/L	14.4	68.1	W	2.15	10.5	10	3.8	105	39.9	21.5	8.16
4	Total Kjeldahl nitrogen	0.5	mg/L	48.3	228	D	4.4	47.6	6.6	1.9	316	93	29	8.5
5	DOC	0.5	mg/L	50.7	296	D	23.6	257	2.63	1.33	676	341	62	31
6	Total phosphorus	0.1	mg/L	4.23	19.3	W	0.71	3.47	5.45	2.07	18.9	7.18	3.87	1.47
8	Total suspended solids	5	mg/L	293	1460	D	15	73.4	4.25	1.37	312	101	64	21
9	Chromium	20	ug/L	41.7	0.193	W	41.7	0.193	5.53	2.37	1.07	0.457	218	93.5
9	Cobalt	20	ug/L	185	0.858	W	25	0.12	5.95	1.9	0.714	0.228	146	46.6
9	Copper	10	ug/L	163	0.829	W	13	0.064	4.33	1.44	0.277	0.098	56.7	20*
9	Vanadium	30	ug/L	105	0.493	W	30	0.15	2.71	1.46	0.58	0.29	120*	60*
14	Phenolics (4AAP)	2	ug/L	18.7	0.0944	W	10.1	0.049	4.55	1.87	0.22	0.092	45	19
25	Oil and grease	1	mg/L	6.44	31	W	3.8	18.6	4.6	1.89	85.6	35.2	17.5	7.2

* – Based on minimum RMDL multiple

Plant Site / Control Point – Du Pont Canada Inc. (Maitland) 0400

				CURRENT		BAT #2	PERFORMANCE – SS							
ATG	PARAMETER	RMDL	UNIT	CLTA	LLTA	Freq.	CLTA	LLTA	LVF1	LVFM	BDL	BML	BDC	BMC
5	DOC	0.5	mg/L	2.58	14.2	D	2.58	14.2	2.07	1.13	29.4	16	5.33	2.9
6	Total phosphorus	0.1	mg/L	0.1	0.546	W	0.1	0.546	3.83	1.5	2.09	0.819	0.4*	0.2*
8	Total suspended solids	5	mg/L	14.3	79.7	D	14.3	79.7	4.24	1.36	338	108	61	20
10	Arsenic	5	ug/L	18.9	0.1	W	18.9	0.1	8.87	1.86	0.887	0.186	161	33.8
14	Phenolics (4AAP)	2	ug/L	4.63	0.0283	W	4.63	0.028	2.52	1.56	0.0706	0.0437	12.8	7.93
16	Tetrachloroethylene	1.1	ug/L	278	1.61	D	18.4	0.1	10	6.05	1	0.605	181	110
23	Hexachlorobenzene	10	ng/L	195	0.0012	Q	195	0.0012	4.41	–	0.00529	–	960	–
25	Oil and grease	1	mg/L	1.14	6.26	W	1.14	6.26	4.95	1.71	31	11	5.62	2.0*

* – Based on minimum RMDL multiple

Plant Site / Control Point – Du Pont Canada Inc. (Whitby) 0200

				CURRENT		BAT #2	PERFORMANCE – NAT							
ATG	PARAMETER	RMDL	UNIT	CLTA	LLTA	Freq.	CLTA	LLTA	LVF1	LVFM	BDL	BML	BDC	BMC
5	DOC	0.5	mg/L	3.47	2.27	W	3.47	2.27	2.61	1.44	5.92	3.3	9.06	5
6	Total phosphorus	0.1	mg/L	0.104	0.0708	Q	0.104	0.071	1.68	–	0.26	–	0.4*	–
8	Total suspended solids	5	mg/L	2.98	1.91	W	2.98	1.91	4.48	1.85	13.1	6.54	20*	10*
14	Phenolics (4AAP)	2	ug/L	4.58	0.003	W	4.58	0.003	5.21	2.02	0.0156	0.00606	23.9	9.3
25	Oil and grease	1	mg/L	1.3	0.89	W	1.3	0.89	4.84	1.87	4.31	1.66	6.59	2.54

Appendix B

Current Performance (1989–90 Monitoring Data) versus BAT #2 Performance for the OCM Sector

Plant Site / Control Point – Ethyl Canada Inc. 0200

				CURRENT		BAT # 2	PERFORMANCE – FIL / SS/ GAC / CP							
ATG	PARAMETER	RMDL	UNIT	CLTA	LLTA	Freq.	CLTA	LLTA	LVF1	LVFM	BDL	BML	BDC	BMC
4	Nitrate + Nitrite	0.25	mg/L	20	7.36	W	5	1	5	2.5	0.3	0.15	25	12.5
5	DOC	0.5	mg/L	6.7	1.32	D	4.4	0.91	5.66	1.64	0.3	0.087	25	7.3
6	Total phosphorus	0.1	mg/L	0.09	0.017	Q	0.09	0.017	2.24	–	0.0048	–	0.4*	–
8	Total suspended solids	5	mg/L	24	6.46	D	5	1.04	7.6	1.72	0.46	0.12	38	10*
9	Aluminum	30	ug/L	91100	23.3	D	5800	1.2	5	2.49	0.35	0.17	29166	14166
9	Chromium	20	ug/L	52	0.01	Q	52	0.01	7.03	2.42	0.0043	–	358	–
9	Lead	30	ug/L	534	0.12	D	150	0.031	9.77	1.92	0.018	0.0035	1500	292
12	Mercury	0.1	ug/L	0.16	–	Q	0.16	0.00003	8.71	–	0.000017	–	1.42	–
14	Phenolics (4AAP)	2	ug/L	19.6	0.004	W	2.5	0.0005	7.79	2.6	0.00023	0.000078	19.2	6.5
16	1,2–Dichloroethane	0.8	ug/L	219	0.052	W	73	0.015	8.06	3.13	0.0071	0.0028	592	233
16	Ethylene dibromide	1	ug/L	164	0.043	Q	164	0.043	1.08	1.06	0.0021	–	175	–
17	Toluene	0.5	ug/L	453	0.09	W	5.4	0.000065	7.32	1.54	0.00047	0.0001	392	8.3
25	Oil and grease	1	mg/L	8.9	2	W	4.1	0.85	3.4	2.7	0.17	0.13	14.2	9.2

* – Plant mothballed May 1993 – flow reduced from 207 m3/d to 12 m3/d

Plant Site / Control Point – Ethyl Canada Inc. 0300

				CURRENT		BATCH OPERATION BAT # 2 PERFORMANCE – CP / SS / FIL				Data Values per Batch	
ATG	PARAMETER	RMDL	UNIT	CLTA	LLTA	Freq.	CLTA	LLTA	LVF1	BDL	BDC
5	DOC	0.5	mg/L	20.1	14.5	B	4.4	1.3	2.8	3.64	7.51
6	Total phosphorus	0.1	mg/L	0.182	0.215	XQ	0.182	0.1	2.8	0.28	0.58
8	Total suspended solids	5	mg/L	50.6	39.2	B	8	3.8	2.9	11	22.7
9	Aluminum	30	ug/L	20100	14.1	B	5800	1.7	4.37	7.43	15300
9	Boron	50	ug/L	2650	2.17	XW	2650	1.1	2.5	2.75	5670
9	Lead	30	ug/L	16700	11.7	B	1300	0.63	3.8	2.39	4940
9	Zinc	10	ug/L	52.8	0.0364	XQ	52.8	0.018	10	0.18	371
12	Mercury	0.1	ug/L	0.357	0.0003	XW	0.357	0.00015	8.67	0.0013	2.68
13	Total Alkyl Lead	2	ug/L	263	0.186	B	630	0.31	3.6	1.12	2300
14	Phenolics (4AAP)	2	ug/L	177	0.0987	XW	2.5	0.00075	7.3	0.0055	11.3
15	Sulphide	20	ug/L	138	0.085	XW	138	0.043	3.59	0.154	318
16	1,2–Dichloroethane	0.8	ug/L	2480	2.07	B	150	0.074	2.8	0.207	427
16	Ethylene dibromide	1	ug/L	79.9	0.0567	B	37.5	0.018	4.6	0.083	171
16	Methylene chloride	1.3	ug/L	554	0.368	XW	10	0.003	10	0.03	62
17	Toluene	0.5	ug/L	325	0.304	XQ	5.4	0.0016	2.88	0.0046	9.5
19	1–Methylnaphthalene	3.2	ug/L	17.5	0.0137	XQ	17.5	0.0068	3.89	0.0265	55
19	2–Methylnaphthalene	2.2	ug/L	11.4	0.0099	XQ	11.4	0.005	5.22	0.026	54
19	Acenaphthene	1.3	ug/L	9.54	0.0077	XQ	9.54	0.004	2.24	0.009	18.5
19	Biphenyl	0.6	ug/L	5.15	0.0044	XQ	5.15	0.0022	3.87	0.0085	17.6
19	Fluorene	1.7	ug/L	5.58	0.0047	XQ	5.58	0.0024	3.36	0.0081	16.6
19	Indole	1.9	ug/L	437	0.352	XQ	437	0.176	3.83	0.67	1390
19	Naphthalene	1.6	ug/L	5.76	0.0045	XQ	5.76	0.0023	5.59	0.013	26.5
19	Phenanthrene	0.4	ug/L	4.06	0.0035	XQ	4.06	0.0017	3.74	0.0064	13
25	Oil and grease	1	mg/L	5.88	4.7	B	4	2	4.1	8.2	17

B – each Batch, XW – every 14th Batch, XQ – every 180th batch

Appendix B

Current Performance (1989–90 Monitoring Data) versus BAT #2 Performance for the OCM Sector

Plant Site / Control Point – Geon Canada Inc. 0100

Last three months of monitoring period only

				CURRENT			BAT # 2	PERFORMANCE – NAT						
ATG	PARAMETER	RMDL	UNIT	CLTA	LLTA	Freq.	CLTA	LLTA	LVF1	LVFM	BDL	BML	BDC	BMC
2	Cyanide Total	0.005	mg/L	0.055	0.11	Q	0.055	0.11	3.64	–	0.4	–	0.212	–
4	Ammonia plus Ammonium	0.25	mg/L	0.358	0.694	W	0.358	0.694	5.06	1.98	3.51	1.4	1.86	0.73
4	Total Kjeldahl nitrogen	0.5	mg/L	1.42	2.93	D	1.42	2.93	3.55	1.33	10.4	3.9	5.5	2.06
5	DOC	0.5	mg/L	6.59	13.1	D	6.59	13.1	5.4	1.63	70.7	21.4	37.4	11.3
6	Total phosphorus	0.1	mg/L	0.088	0.179	W	0.088	0.179	5.49	2.09	0.98	0.37	0.519	0.196
8	Total suspended solids	5	mg/L	16.9	32.8	D	15	28.4	4.38	1.27	124	36	66	19
9	Aluminum	30	ug/L	544	1.81	Q	544	1.81	3.9	1.72	7.06	–	3730	–
14	Phenolics (4AAP)	2	ug/L	5.67	0.0242	W	5.67	0.024	10	3.25	0.24	0.078	127	41.3
16	Vinyl chloride	4	ug/L	7.31	0.0183	W	7.3	0.018	10	3.8	0.18	0.068	95	36.1
25	Oil and grease	1	mg/L	1.38	3.17	W	1.38	3.17	3.96	1.76	12.6	5.58	6.64	2.95

Plant Site / Control Point – G.E. Plastics Canada Ltd. 0100

				CURRENT			BAT # 2	PERFORMANCE – NAT						
ATG	PARAMETER	RMDL	UNIT	CLTA	LLTA	Freq.	CLTA	LLTA*	LVF1	LVFM	BDL	BML	BDC	BMC
2	Cyanide Total	0.005	mg/L	0.088	0.157	Q	0.088	0.049	5.08	–	0.25	–	0.45	–
4	Ammonia plus Ammonium	0.25	mg/L	20.2	37.5	W	1.57	0.88	3.52	2.21	3.1	1.9	5.5	3.4
4	Nitrate+Nitrite	0.25	mg/L	24.4	40.5	W	2.15	1.2	10	3.83	12	4.6	21.5	8.23
4	Total Kjeldahl nitrogen	0.5	mg/L	24.4	44.7	D	2.3	1.3	10	9.1	12.9	11.7	23.1	20.9
5	DOC	0.5	mg/L	16.5	29.2	D	16.5	9.1	5.04	2.14	46	19.6	82.3	35.1
6	Total phosphorus	0.1	mg/L	0.512	0.837	W	0.51	0.26	7.87	2.59	2.1	0.68	3.76	1.21
8	Total suspended solids	5	mg/L	25.8	43.2	D	15	8.4	5.33	1.64	44.7	13.8	80	24.7
9	Aluminum	30	ug/L	236	0.38	Q	236	0.12	7.06	2.43	0.84	–	1500	–
10	Antimony	5	ug/L	62.5	0.107	Q	62.5	0.033	4.92	–	0.16	–	286	–
14	Phenolics (4AAP)	2	ug/L	43.3	0.074	W	10.1	0.006	4.55	1.87	0.026	0.011	47	20
25	Oil and grease	1	mg/L	2.5	4.44	W	2.5	1.4	4.11	1.78	5.7	2.5	10.2	4.47

* – Revised on new flow of 559 m3/d versus 1787 m3/d during monitoring period.

Plant Site / Control Point – Goodyear Canada Inc. (Bowmanville) 0600

				CURRENT			BAT #2	PERFORMANCE – OIL SEP / BMP						
ATG	PARAMETER	RMDL	UNIT	CLTA	LLTA	Freq.	CLTA	LLTA	LVF1	LVFM	BDL	BML	BDC	BMC
5	DOC	0.5	mg/L	4.3	–	W	16.7	0.78	3.68	1.68	2.87	1.31	61.1	27.9
6	Total phosphorus	0.1	mg/L	0.03	–	Q	0.71	0.033	5.49	–	0.181	–	3.85	–
8	Total suspended solids	5	mg/L	7.3	–	D	14.9	0.7	4.75	1.37	3.33	0.959	70.7	20.4
9	Aluminum	30	ug/L	153	–	Q	236	0.011	7.1	–	0.0781	–	1660	–
14	Phenolics (4AAP)	2	ug/L	25.5	–	W	10	0.00047	4.55	1.87	0.00214	0.000879	45.5	18.7
15	Sulphide	20	ug/L	46	–	W	200	0.0094	13.5	4.03	0.127	0.0379	2700	806
25	Oil and grease	1	mg/L	9	–	W	4.1	0.19	8.2	2.67	1.56	0.507	33.1	10.8

Plant Site / Control Point – Goodyear Canada Inc. (Bowmanville) 0800

				CURRENT			BAT #2	PERFORMANCE – OIL SEP / BMP						
ATG	PARAMETER	RMDL	UNIT	CLTA	LLTA	Freq.	CLTA	LLTA	LVF1	LVFM	BDL	BML	BDC	BMC
5	DOC	0.5	mg/L	4.4	–	W	16.7	0.1	3.68	1.68	0.368	0.168	60.3	27.5
6	Total phosphorus	0.1	mg/L	0.02	–	Q	0.71	0.0043	5.49	–	0.024	–	3.9	–
8	Total suspended solids	5	mg/L	3.6	–	D	14.9	0.09	4.75	1.37	0.428	0.123	70.1	20.2
9	Aluminum	30	ug/L	48.3	–	Q	236	0.0014	7.1	–	0.01	–	1640	–
9	Zinc	10	ug/L	87.3	–	Q	50	0.0003	4.1	–	0.00123	–	202	–
14	Phenolics (4AAP)	2	ug/L	6.1	–	W	10	0.00006	4.55	1.87	0.000273	0.000112	44.8	18.4
15	Sulphide	20	ug/L	29.7	–	W	200	0.0012	13.5	4.03	0.0162	0.00484	2660	793
25	Oil and grease	1	mg/L	3.7	–	W	4.1	0.03	8.2	2.67	0.246	0.0801	40.3	13.1

Appendix B

Current Performance (1989–90 Monitoring Data) versus BAT #2 Performance for the OCM Sector

Plant Site / Control Point – Guardsman Products Ltd. 0100

				CURRENT		BAT # 2	PERFORMANCE – NAT							
ATG	PARAMETER	RMDL	UNIT	CLTA	LLTA	Freq.	CLTA	LLTA	LVF1	LVFM	BDL	BML	BDC	BMC
5	DOC	0.5	mg/L	4.49	0.45	W	4.49	0.45	3.81	1.71	1.71	0.77	16.5	7.4
6	Total phosphorus	0.1	mg/L	0.119	0.0122	Q	0.119	0.012	2.43	1.52	0.042	–	0.4*	–
8	Total suspended solids	5	mg/L	3.22	0.225	W	5	0.52	3.3	1.76	2.13	1	20*	10*
17	Toluene	0.5	ug/L	5.22	–	W	5.2	0.0005	3.81	1.71	0.00191	0.000855	18.3	8.22
25	Oil and grease	1	mg/L	0.862	0.0753	W	0.86	0.075	3.81	1.71	0.42	0.21	4.0*	2.0*

* – Based on minimum RMDL multiple

Plant Site / Control Point – Imperial Oil Chemicals Division 0300

				CURRENT		BAT # 2	PERFORMANCE – NAT							
ATG	PARAMETER	RMDL	UNIT	CLTA	LLTA	Freq.	CLTA	LLTA	LVF1	LVFM	BDL	BML	BDC	BMC
5	DOC	0.5	mg/L	6.69	192	D	6.69@	147	1.65	1.08	406	268	10.8	7.2
6	Total phosphorus	0.1	mg/L	0.025	0.718	Q	0.025	0.718	2.19	–	11.6	–	0.4*	–
8	Total suspended solids	5	mg/L	6.15	181	D	7.5@	278	2.9	1.2	807	420	21.8	10*
14	Phenolics (4AAP)	2	ug/L	2.15	0.062	W	4.25@	0.16	2.12	1.33	0.34	0.21	8.9	5.1
16	Vinyl chloride	4	ug/L	7.73	0.202	D	40.8@	1.42	6.3	1.6	8.9	2.2	255	63
17	Benzene	0.5	ug/L	4.74	0.135	D	4.74	0.135	6.19	1.41	0.836	0.19	28.9	6.59
17	Toluene	0.5	ug/L	4.92	0.145	Q	4.92	0.145	9.93	–	1.44	–	49.8	–
23	Hexachlorobutadiene	10	ng/L	55.3	0.001	Q	55.3	0.001	9.09	–	0.00909	–	315	–
25	Oil and grease	1	mg/L	1.32	38.1	W	1.36@	49.6	1.79	1.24	148	72.2	4.0*	2.0*

* – Based on minimum RMDL multiple

@ – Based on one year of performance data (1993) – outliers excluded

Plant Site / Control Point – Morbern Inc. 0100

				CURRENT		BAT # 2	PERFORMANCE – GAC/FIL							
ATG	PARAMETER	RMDL	UNIT	CLTA	LLTA	Freq.	CLTA	LLTA	LVF1	LVFM	BDL	BML	BDC	BMC
5	DOC	0.5	mg/L	2.62	3.38	W	2.62	3.38	1.75	1.23	5.92	4.16	4.81	3.38
6	Total phosphorus	0.1	mg/L	0.029	0.0412	Q	0.029	0.041	5.39	–	0.221	–	0.18	–
8	Total suspended solids	5	mg/L	3.15	4.22	W	5	6.2	1.72	1.22	24.6	12.3	20*	10*
9	Aluminum	30	ug/L	121	0.173	Q	121	0.173	1.99	–	0.344	–	280	–
9	Zinc	10	ug/L	42.8	0.0539	Q	42.8	0.054	4.1	–	0.221	–	180	–
14	Phenolics (4AAP)	2	ug/L	57.3	0.0176	W	2.5	0.0031	7.53	2.54	0.0233	0.00787	19	6.4
25	Oil and grease	1	mg/L	1.15	1.52	W	1.15	1.52	2.26	1.32	4.9	2.5	4.0*	2.0*

* – Based on minimum RMDL multiple

Plant Site / Control Point – Novacor Chemicals Ltd. 0100

				CURRENT		BAT # 2	PERFORMANCE – BMP							
ATG	PARAMETER	RMDL	UNIT	CLTA	LLTA	Freq.	CLTA	LLTA	LVF1	LVFM	BDL	BML	BDC	BMC
5	DOC	0.5	mg/L	5.06	8.46	W	5.06	8.46	2.2	1.35	18.6	11.4	11.2	6.9
6	Total phosphorus	0.1	mg/L	0.412	0.679	W	0.412	0.679	2.81	1.54	1.91	1.05	1.15	0.63
8	Total suspended solids	5	mg/L	15	24.8	D	15	24.8	3.93	1.37	97.5	34	58.7	20.5
9	Aluminum	30	ug/L	542	0.886	Q	542	0.89	2.92	1.51	2.6	–	1570	–
9	Zinc	10	ug/L	34.3	0.0558	Q	34.3	0.056	5.05	–	0.283	–	170	–
14	Phenolics (4AAP)	2	ug/L	1.71	0.0028	W	1.71	0.003	4.91	2.02	0.0147	0.007	8.87	4.0*
25	Oil and grease	1	mg/L	1.3	2.16	W	1.3	2.16	2.88	1.46	6.6	3.3	4.0*	2.0*

* – Based on minimum RMDL multiple

Appendix B Current Performance (1989–90 Monitoring Data) versus BAT #2 Performance for the OCM Sector

Plant Site / Control Point – Polysar Rubber Corporation 0900

				CURRENT			BAT # 2	PERFORMANCE – SS						
ATG	PARAMETER	RMDL	UNIT	CLTA	LLTA	Freq.	CLTA	LLTA	LVF1	LVFM	BDL	BML	BDC	BMC
5	DOC	0.5	mg/L	10.8	25.6	D	10.8	25.6	4.42	1.33	113	34	41.8	12.6
6	Total phosphorus	0.1	mg/L	0.363	0.765	W	0.36	0.77	5.21	2.02	4.01	1.56	1.48	0.58
8	Total suspended solids	5	mg/L	24.2	59.6	D	24.2	59.6	5.6	1.39	334	82.8	123	30.6
9	Aluminum	30	ug/L	3440	7.37	W	1500	4.07	8.79	2.84	35.8	11.6	13200	4280
9	Zinc	10	ug/L	718	1.62	W	718	1.62	8.4	2.74	13.6	4.44	5020	1640
14	Phenolics (4AAP)	2	ug/L	9.68	0.0206	W	9.68	0.021	5.36	2.05	0.113	0.0431	41.5	15.9
16	Bromomethane	3.7	ug/L	4150	10	D	50	0.14	10	2.27	1.4	0.318	517	117
16	Chloroform	0.7	ug/L	67.7	0.21	W	10.5	0.028	10	3.52	0.28	0.099	103	37
16	Chloromethane	3.7	ug/L	56500	141	D	50	0.14	10	2.77	1.4	0.388	517	143
16	Methylene chloride	1.3	ug/L	201	0.534	Q	10	0.027	7.62	–	0.206	–	75.9	–
17	Benzene	0.5	ug/L	247	0.386	W	10	0.027	10	3.39	0.27	0.092	100	39
25	Oil and grease	1	mg/L	5.72	13.4	W	3.76	10.2	3.1	1.6	31.6	16.3	12	6

Plant Site / Control Point – Polysar Rubber Corporation 1700

				CURRENT			BAT #2	PERFORMANCE – NAT						
ATG	PARAMETER	RMDL	UNIT	CLTA	LLTA	Freq.	CLTA	LLTA	LVF1	LVFM	BDL	BML	BDC	BMC
4	Total Kjeldahl Nitrogen	0.5	mg/L	1.97	1.9	D	1.97	1.9	5.62	2.11	10.7	4.01	25.5	9.59
5	DOC	0.5	mg/L	8.89	6.95	D	8.89	6.95	3.96	1.74	27.5	12.1	65.8	28.9
6	Total phosphorus	0.1	mg/L	0.11	0.0817	W	0.11	0.0817	5.49	2.06	0.449	0.17	1.07	0.41
8	Total suspended solids	5	mg/L	12.4	10.1	D	12.4	10.1	2.23	1.88	22.5	19	53.8	45.5
9	Aluminum	30	ug/L	163	0.09	D	47	0.02	7.19	2.46	0.144	0.0492	344	118
9	Zinc	10	ug/L	17.1	61.3	W	17.1	0.012	8.4	2.46	0.101	0.0295	241	71
14	Phenolics (4AAP)	2	ug/L	16.3	0.0107	W	16.3	0.0107	4.55	1.87	0.0487	0.02	117	47.8
25	Oil and grease	1	mg/L	3.47	2.68	W	3.47	2.68	3.14	1.57	8.42	4.21	20.1	10.1

Plant Site / Control Point – Polysar Polysar Rubber Corporation 1800

				CURRENT			BAT # 2	PERFORMANCE – SS						
ATG	PARAMETER	RMDL	UNIT	CLTA	LLTA	Freq.	CLTA	LLTA	LVF1	LVFM	BDL	BML	BDC	BMC
4	Ammonia plus Ammonium	0.25	mg/L	1.57	19.6	W	1.57	19.6	10	3.47	196	68	15	5.4
4	Nitrate + Nitrite	0.25	mg/L	2.15	29	W	2.15	29	10	3.63	290	105	22.8	8.29
4	Total Kjeldahl nitrogen	0.5	mg/L	2.32	29	D	2.32	29	5.62	1.62	196	47	15	3.7
5	DOC	0.5	mg/L	16.7	200	D	16.7	200	3.68	1.43	736	286	58	22.5
6	Total phosphorus	0.1	mg/L	0.711	8.46	W	0.71	8.46	5.49	2.09	46.4	17.7	3.66	1.39
8	Total suspended solids	5	mg/L	14.9	189	D	14.9	253	4.25	1.37	1075	347	54	17
9	Aluminum	30	ug/L	1450	18.5	W	1450	18.5	7.19	2.46	133	45.5	10500	3583
9	Cobalt *	20	ug/L	469	1.29	W	80	0.21	1.94	1.33	0.4	0.28	31	22
9	Zinc	10	ug/L	20	0.25	W	20	0.25	4.56	1.88	1.14	0.47	90	37
14	Phenolics (4AAP)	2	ug/L	10.1	0.113	W	10.1	0.11	4.55	1.87	0.501	0.206	39.4	16.2
16	Bromoform	3.7	ug/L	9.8	0.122	W	9.8	0.12	10	3.11	1.2	0.373	94	29.4
16	Chloroform	0.7	ug/L	7.54	0.0941	W	7.54	0.094	10	3.11	0.94	0.292	74	23
16	Chloromethane *	3.7	ug/L	167	0.47	D	10	0.07	10	3	0.7	0.21	55	17
17	Benzene	0.5	ug/L	1.62	0.0117	W	1.62	0.012	10	3.64	0.12	0.043	9	3.4
25	Oil and grease	1	mg/L	3.76	47.2	W	3.76	47.2	3.14	1.57	148	74.1	11.7	5.83

* – Current Performance from 0300 effluent which is being diverted to Biox.

Appendix B

Current Performance (1989–90 Monitoring Data) versus BAT #2 Performance for the OCM Sector

Plant Site / Control Point – Rohm and Haas Canada Inc. (Morrisburg) 0100

				CURRENT			BAT # 2	PERFORMANCE – GAC/FIL						
ATG	PARAMETER	RMDL	UNIT	CLTA	LLTA	Freq.	CLTA	LLTA	LVF1	LVFM	BDL	BML	BDC	BMC
5	DOC	0.5	mg/L	9.87	6.15	D	4.4	2.84	5.65	1.75	16	4.97	24.9	7.71
6	Total phosphorus	0.1	mg/L	0.206	0.146	Q	0.21	0.15	4.36	1.86	0.654	–	1.01	–
8	Total suspended solids	5	mg/L	6.54	4.09	D	5	3.23	4.17	1.34	13.5	6.5	20.9	10*
14	Phenolics (4AAP)	2	ug/L	3.75	0.0027	W	2.5	0.0016	3.49	1.64	0.00558	0.00262	8.66	4.1
17	Toluene	0.5	ug/L	85.3	0.0635	W	5.4	0.0035	10	3.76	0.035	0.0132	54	20.4
25	Oil and grease	1	mg/L	1.71	1.21	W	1.71	1.21	3.94	1.74	4.77	2.11	7.39	3.26

Plant Site / Control Point – Stepan Canada Ltd. 0200

				CURRENT			BAT # 2	PERFORMANCE – NAT						
ATG	PARAMETER	RMDL	UNIT	CLTA	LLTA	Freq.	CLTA	LLTA	LVF1	LVFM	BDL	BML	BDC	BMC
4	Ammonia plus Ammonium	0.25	mg/L	1.43	0.178	W	1.43	0.178	6.77	2.36	1.21	0.42	3	2.79
4	Total Kjeldahl nitrogen	0.5	mg/L	4.79	0.61	D	2.3	0.31	4.74	1.47	1.47	0.456	10.8	3.35
5	DOC	0.5	mg/L	36.1	4.75	D	16.7	2.27	2.71	1.25	6.15	2.84	45.2	20.9
6	Total phosphorus	0.1	mg/L	0.228	0.0314	W	0.228	0.031	5.13	1.97	0.159	0.0611	1.17	0.449
8	Total suspended solids	5	mg/L	11.6	1.56	D	11.6	1.56	4.03	1.33	6.29	2.07	46.2	15.3
9	Aluminum	30	ug/L	838	0.105	W	838	0.105	6.48	2.3	0.68	0.242	5000	1780
14	Phenolics (4AAP)	2	ug/L	15.6	0.0019	W	10.1	0.0014	5.2	2.01	0.00728	0.00281	53.5	20.7
16	Carbon tetrachloride	1.3	ug/L	5.12	0.0006	Q	1.3	0.0002	10	–	0.002	–	14	–
16	Chloroform	0.7	ug/L	7.94	0.0011	Q	7.9	0.001	5.43	–	0.00543	–	39.9	–
25	Oil and grease	1	mg/L	11	1.57	W	3.8	0.52	4.23	1.8	2.2	0.936	16.2	6.88
27	PCBT	0.1	ug/L	30	0.0037	Q	30	0.004	10	–	0.04	–	294	–

Process Effluent Currently Diverted to Municipal Treatment

Plant Site / Control Point – Oxychem Durez Canada 0100

				CURRENT			BAT # 2	PERFORMANCE – GAC/FIL						
ATG	PARAMETER	RMDL	UNIT	CLTA	LLTA	Freq.	CLTA	LLTA	LVF1	LVFM	BDL	BML	BDC	BMC
5	DOC	0.5	mg/L	2.37	0.19	W	2.37	0.19	6.24	2.24	1.19	0.426	15.7	5.64
6	Total phosphorus	0.1	mg/L	0.015	0.0012	Q	0.015	0.001	9.08	2.87	0.0302	–	0.4*	–
8	Total suspended solids	5	mg/L	6.17	0.343	D	6.17	0.343	8.58	2.73	2.94	0.936	39	12.4
9	Chromium	20	ug/L	32	0.002	Q	17	0.0013	10	–	0.013	–	172	–
9	Zinc	10	ug/L	26.6	0.002	Q	26.6	0.002	7.73	–	0.0155	–	205	–
14	Phenolics (4AAP)	2	ug/L	33.6	0.0042	D	2.5	0.00019	10	2.13	0.0019	0.000405	25.1	5.36
25	Oil and grease	1	mg/L	1.75	0.139	W	1.75	0.139	9.09	2.81	1.26	0.391	16.7	5.17

Footnotes:

*** – Based on minimum RMDL multiple; Minimum BDC = 4 times RMDL, Minimum BMC = 2times RMDL**

APPENDIX C

THE DRAFT REGULATION

DRAFT REGULATION TO BE MADE UNDER THE ENVIRONMENTAL PROTECTION ACT

EFFLUENT MONITORING AND EFFLUENT LIMITS - ORGANIC CHEMICAL MANUFACTURING SECTOR

PART I - GENERAL

Interpretation

1.-(1) In this Regulation,

"assessment parameter" means a parameter that is listed in column 1 of Schedule 4 for the discharger's plant;

"blowdown water" means recirculating water that is discharged from a cooling water system for the purpose of controlling the level of water in the cooling water system or for the purpose of discharging from the cooling water system materials contained in the cooling water system the further build-up of which would impair the operation of the system;

"combined effluent" means process effluent combined with cooling water effluent or storm water effluent, or both;

"combined effluent monitoring stream" means a stream on which a combined effluent sampling point is established;

"combined effluent sampling point", in relation to a plant, means a combined effluent sampling point that is specified for the plant in Schedule 4;

"common parameter", in relation to a combined effluent monitoring stream at a plant, means an assessment parameter that is also a limited parameter in the circumstances described in subsection 14(1);

"cooling water effluent" means water and associated material that is used in an industrial process for the purpose of removing heat and that has not, by design, come into contact with process materials, but does not include blowdown water ;

"cooling water effluent monitoring stream" means a stream on which a cooling water effluent sampling point is established;

"cooling water effluent sampling point", in relation to a plant, means a cooling water effluent sampling point that is specified for the plant in Schedule 4;

"Director", in relation to obligations of a discharger, means a Director appointed under section 5 of the Act and responsible for the region in which the discharger's plant is located and includes an alternate named by the Director;

"discharger" means an owner or person in occupation or having the charge, management or control of a plant to which this Regulation applies;

"limited parameter", in relation to a plant, means a parameter for which a limit is specified for the plant in column 3, 4 or 5 of Schedule 2;

"pick up", in relation to a sample, means pick up for the purpose of storage, if any, at a plant, including storage within an automated sampling device at the plant, and transportation to and analysis at a laboratory;

"plant" means an industrial facility and the developed property, waste disposal sites and wastewater treatment facilities associated with it;

"process change" means a change in equipment, production processes, process materials or treatment processes;

"process effluent" means,

(a) effluent that, by design, has come into contact with process materials,

(b) blowdown water,

(c) effluent that results from cleaning or maintenance operations at a plant during a period when all or part of the plant is shut down, and

(d) waste disposal site effluent;

"process effluent batch" means a process effluent that is discharged intermittently with a discharge duration of less than 24 hours for each batch and a time interval of at least 8 hours between successive batches;

"process effluent batch monitoring stream" means a stream on which a process effluent batch sampling point is established;

"process effluent batch sampling point", in relation to a plant, means a process effluent batch sampling point that is specified for the plant in Schedule 3;

"process effluent monitoring stream" means a stream on which a process effluent sampling point is established;

"process effluent sampling point", in relation to a plant, means a process effluent sampling point that is specified for the plant in Schedule 2 or 3, as the case may be;

"process materials", in relation to a discharger's plant, means raw materials for use in an industrial process at the plant, manufacturing intermediates produced at the plant, or products or by-products of an industrial process at the plant, but does not include chemicals added to cooling water for the purpose of controlling organisms, fouling and corrosion;

"quarter" means all or part of a period of three consecutive months beginning on the first day of January, April, July or October;

"semi-annual period" means all or part of a period of six months beginning on the first day of January or July;

"specific parameter", in relation to a plant, means 2,3,7,8-tetrachlorodibenzo-para-dioxin, 2,3,7,8-tetrachlorodibenzofuran, and 2,3,7,8 substituted dioxin and furan congeners;

"storm water effluent" means run-off from a storm event or thaw that is not used in any industrial process.

(2) For greater certainty, this Regulation applies both to effluent streams that discharge continuously and to effluent streams that discharge intermittently.

(3) An obligation on a discharger to do a thing under this Regulation is discharged if another person has done it on the discharger's behalf.

Purpose

2. The purpose of this Regulation is to monitor and control the quality of effluent discharged from the plants listed in Schedule 1.

Application

3.-(1) This Regulation applies only with respect to the plants listed in Schedule 1.

(2) This Regulation does not apply with respect to the discharge of effluent to a municipal sewer.

Obligations Under Approvals, Orders, etc.

4. For greater certainty, the requirements of this Regulation are in addition to and independent of requirements in an approval, order, direction or other instrument issued under any Act.

Non-application of the General Effluent Monitoring Regulation

5. This Regulation is not a Sectoral Effluent Monitoring Regulation within the meaning of Ontario Regulation 695/88.

By-passes

6. Beginning on _________, 19__, a discharger shall not permit process effluent to be discharged from the discharger's plant unless the process effluent flows past a process effluent sampling point or a process effluent batch sampling point at the plant before being discharged.

(The date that is 3 years after the day on which this Regulation is filed will be inserted in section 6)

Sampling and Analytical Procedures

7.-(1) Each discharger shall carry out the sampling and analysis obligations of this Regulation, including quality control sampling and analysis obligations, in accordance with the procedures described in the Ministry of Environment and Energy publication entitled "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater", dated August, 1994.

(2) Each discharger shall maintain the sampling equipment used at the discharger's plant for sampling required by this Regulation in a way that ensures that the samples collected at the plant under this Regulation accurately reflect the level of discharge of each limited parameter, assessment parameter and specific parameter from the plant.

PART II - SAMPLING POINTS

Sampling Points To Be Used

8.-(1) Subject to section 23, each discharger shall, by ____ , 19__, use the sampling points specified for the discharger's plant in the Schedules to this Regulation for the purpose of carrying out all sampling required by this Regulation.

(The date that is 90 days after the day on which this Regulation is filed will be inserted in subsection 8(1)).

(2) If circumstances change so that a new sampling point is necessary at a discharger's plant in order to permit the calculation of plant loadings under sections 10, 11, 12, 13 and 14 for each limited parameter and assessment parameter and the determination of concentrations for each specific parameter that accurately reflect the level of discharge of each such parameter from the plant, the discharger shall, within thirty days of the change, establish the new sampling point.

(3) A discharger may eliminate a sampling point established under subsection (1) or (2) if the sampling point is no longer necessary to permit the calculation of plant loadings under sections 10, 11, 12, 13 and 14 for each limited parameter and assessment parameter and the determination of concentrations for each specific parameter that accurately reflect the level of discharge of each such parameter from the plant.

(4) Before using a new sampling point or eliminating a sampling point specified in the Schedules to this Regulation, a discharger shall give the Director written notice setting out the name, number and location of the sampling point and its change in status.

PART III - CALCULATION OF LOADINGS

Calculation of Loadings - General

9.-(1) For the purposes of performing a calculation under sections 10, 11, 12, 13 and 14, a discharger shall use the actual analytical result obtained by the laboratory.

(2) Despite subsection (1), where the actual analytical result is less than one-tenth of the analytical method detection limit set out in the Ministry of Environment and Energy publication entitled "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater", dated August, 1994, the discharger shall use the value zero for the purpose of performing a calculation under sections 10, 11, 12, 13 and 14.

(3) Each discharger shall ensure that each calculation of a process effluent loading required by section 10 and each calculation of a process effluent batch loading required by section 11 is performed as soon as reasonably possible after the analytical result on which the calculation is based becomes available to the discharger.

(4) Each discharger shall ensure that each calculation of a cooling water effluent loading required by section 12 and each calculation of a combined effluent loading required by section 13 is performed in time to comply with subsection 38(4).

(5) Each discharger shall ensure that each calculation of a process effluent loading contribution required by section 14 is performed in time to comply with subsection 38(6).

Calculation of Loadings - Process Effluent- General

10.-(1) Each discharger shall calculate, in kilograms, a daily process effluent stream loading for each limited parameter in each process effluent monitoring stream of the discharger for each day on which a sample is collected under this Regulation from the stream for analysis for the parameter.

(2) When calculating a daily stream loading under subsection (1), the discharger shall multiply, with the necessary adjustment of units to yield a result in kilograms, the analytical result obtained from the sample for the parameter by the daily volume of effluent, as determined under section 31, for the stream for the day.

(3) Each discharger shall calculate, in kilograms, a daily process effluent plant loading for each limited parameter for each day for which the discharger is required to calculate a daily process effluent stream loading for the parameter under subsection (1).

(4) For the purposes of subsection (3), a daily process effluent plant loading for a parameter for a day is the sum, in kilograms, of the daily process effluent stream loadings for the parameter calculated under subsection (1) for the day.

(5) Where a discharger calculates only one daily process effluent stream loading for a parameter for a day under subsection (1), the daily process effluent plant loading for the parameter for the day for the purposes of subsection (3) is the single daily process effluent stream loading for the parameter for the day.

(6) Each discharger shall calculate, in kilograms, a monthly average process effluent plant loading for each limited parameter for each month in which a sample is collected under this Regulation more than once from a process effluent monitoring stream at the discharger's plant for analysis for the parameter.

(7) For the purposes of subsection (6), a monthly average process effluent plant loading for a parameter for a month is the arithmetic mean of the daily process effluent plant loadings for the parameter calculated under subsection (3) for the month.

Calculation of Loadings - Process Effluent - Batch

11.-(1) Each discharger shall calculate, in kilograms, a process effluent batch loading for each limited parameter in each process effluent batch monitoring stream of the discharger for each batch of process effluent for which a sample is collected under this Regulation from the stream for analysis for the parameter.

(2) When calculating a batch loading under subsection (1), the discharger shall multiply, with the necessary adjustment of units to yield a result in kilograms, the analytical result obtained from the sample for the parameter by the volume of effluent, as determined under section 31, for the stream for the batch.

Calculation of Loadings - Cooling Water

12.-(1) Each discharger shall calculate, in kilograms, a daily cooling water effluent stream loading for each assessment parameter in each cooling water effluent monitoring stream of the discharger for each day on which a sample is collected under this Regulation from the stream for analysis for the parameter.

(2) When calculating a daily stream loading under subsection (1), the discharger shall multiply, with the necessary adjustment of units to yield a result in kilograms, the analytical result obtained from the sample for the parameter by the daily volume of effluent, as determined under section 31, for the stream for the day.

(3) Each discharger shall calculate, in kilograms, a daily cooling water effluent plant loading for each assessment parameter for each day for which the discharger is required to calculate a daily cooling water effluent stream loading for the parameter under subsection (1).

(4) For the purposes of subsection (3), a daily cooling water effluent plant loading for a parameter for a day is the sum, in kilograms, of the daily cooling water effluent stream loadings for the parameter calculated under subsection (1) for the day.

(5) Where a discharger calculates only one daily cooling water effluent stream loading for a parameter for a day under subsection (1), the daily cooling water effluent plant loading for the parameter for the day for the purposes of subsection (3) is the single daily cooling water effluent stream loading for the parameter for the day.

(6) Each discharger shall calculate, in kilograms, a monthly average cooling water effluent plant loading for each assessment parameter for each month in which a sample is collected under this Regulation more than once from a cooling water effluent monitoring stream at the discharger's plant for analysis for the parameter.

(7) For the purposes of subsection (6), a monthly average cooling water effluent plant loading for a parameter for a month is the arithmetic mean of the daily cooling water effluent plant loadings for the parameter calculated under subsection (3) for the month.

Calculation of Loadings - Combined Effluent

13.-(1) Each discharger shall calculate, in kilograms, a daily combined effluent stream loading for each assessment parameter in each combined effluent monitoring stream of the discharger for each day on which a sample is collected under this Regulation from the stream for analysis for the parameter.

(2) When calculating a daily stream loading under subsection (1), the discharger shall multiply, with the necessary adjustment of units to yield a result in kilograms, the analytical result obtained from the sample for the parameter by the daily volume of effluent, as determined under section 31, for the stream for the day.

(3) Each discharger shall calculate, in kilograms, a daily combined effluent plant loading for each assessment parameter for each day for which the discharger is required to calculate a combined effluent stream loading for the parameter under subsection (1).

(4) For the purposes of subsection (3), a daily combined effluent plant loading for a parameter for a day is the sum, in kilograms, of the daily combined effluent stream loadings for the parameter calculated under subsection (1) for the day.

(5) Where a discharger calculates only one daily combined effluent stream loading for a parameter for a day under subsection (1), the daily combined effluent plant loading for the parameter for the day for the purposes of subsection (3) is the single daily combined effluent stream loading for the parameter for the day.

(6) Each discharger shall calculate, in kilograms, a monthly average combined effluent plant loading for each assessment parameter for each month in which a sample is collected under this Regulation more than once from a combined effluent monitoring stream at the discharger's plant for analysis for the parameter.

(7) For the purposes of subsection (6), a monthly average combined effluent plant loading for a parameter for a month is the arithmetic mean of the daily combined effluent plant loadings for the parameter calculated under subsection (3) for the month.

Calculation of Additional Loadings - Combined Effluent

14.-(1) For each assessment parameter and each combined effluent monitoring stream of the discharger, the discharger shall determine whether the parameter is also a limited parameter for any process effluent sampling point established on a process effluent monitoring stream that flows into the combined effluent monitoring stream.

(2) The discharger shall calculate, in kilograms, a daily process effluent loading contribution for each common parameter from a process effluent monitoring stream that flows into the combined effluent monitoring stream for each day for which a sample is collected under this Regulation from the combined effluent monitoring stream.

(3) For the purposes of subsection (2), a daily process effluent loading contribution for a common parameter for a day is the sum, in kilograms, of the daily process effluent stream loadings for the parameter calculated under subsection 10(1) for the day in each process effluent monitoring stream that flows into the combined effluent monitoring stream on the day a sample is collected from the combined effluent monitoring stream.

(4) A daily process effluent loading contribution for a common parameter for a day for the purposes of subsection (3) may be a single daily process effluent stream loading for the parameter for the day if,

(a) there is only one process effluent monitoring stream that flows into the combined effluent monitoring stream; or

(b) there is only one daily process effluent stream loading calculated for the parameter under subsection 10(1) for the day in respect of all of the process effluent monitoring streams that flow into the combined effluent monitoring stream.

(5) Each discharger shall calculate, in kilograms, a monthly average process effluent loading contribution for each common parameter for each month in which a sample is collected under this Regulation more than once for analysis for the parameter from any process effluent monitoring stream at the discharger's plant that flows into the combined effluent monitoring stream.

(6) For the purposes of subsection (5), a monthly average process effluent loading contribution for a common parameter for a month is the arithmetic mean of the daily process effluent loading contributions for the parameter calculated under subsection (2) for the month.

PART IV - PARAMETER AND LETHALITY LIMITS

Parameter Limits

15.-(1) Each discharger shall ensure that each daily process effluent plant loading calculated for a parameter under section 10 in connection with the discharger's plant does not exceed the daily plant loading limit specified for the parameter and the plant in Column 3 of Schedule 2.

(2) Each discharger shall ensure that each monthly average process effluent plant loading calculated for a parameter under section 10 in connection with the discharger's plant does not exceed the monthly average plant loading limit specified for the parameter and the plant in Column 4 of Schedule 2.

(3) Each discharger shall ensure that each process effluent batch loading calculated for a parameter under section 11 in connection with the discharger's plant does not exceed the batch loading limit specified for the parameter and the plant in Column 5 of Schedule 2.

(4) Each discharger shall control the quality of each process effluent monitoring stream and each process effluent batch monitoring stream at the discharger's plant to ensure that the concentration of 2,3,7,8-tetrachlorodibenzo-para-dioxin and the concentration of 2,3,7,8-tetrachlorodibenzofuran are both non-measurable in any sample collected at a process effluent sampling point or a process effluent batch sampling point at the plant.

(5) For the purposes of subsection (4), the concentration of 2,3,7,8-tetrachlorodibenzo-para-dioxin in a sample is non-measurable if analysis of the sample shows a concentration of 2,3,7,8-tetrachlorodibenzo-para-dioxin of less than 20 picograms per litre and the concentration of 2,3,7,8-tetrachlorodibenzofuran in a sample is non-measurable if analysis of the sample shows a concentration of 2,3,7,8-tetrachlorodibenzofuran of less than 50 picograms per litre.

(6) Each discharger shall control the quality of each process effluent monitoring stream and each process effluent batch monitoring stream at the discharger's plant to ensure that the total toxic equivalent concentration of 2,3,7,8 substituted dioxin and furan congeners in any sample collected at a process effluent sampling point or a process effluent batch sampling point at the plant, calculated in accordance with the methods described in the Ministry of Environment and Energy publication entitled "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater", dated August, 1994, does not exceed 60 picograms per litre.

(7) Subject to subsection (8), each discharger shall control the quality of each process effluent monitoring stream and each process effluent batch monitoring stream at the discharger's plant to ensure that the pH value of any sample collected at a process effluent sampling point or a process effluent batch sampling point at the plant is within the range of 6.0 to 9.5.

(8) Throughout any day on which a discharger has used an alternate sampling point on a process effluent monitoring stream for sampling required by section 23, as permitted by subsections 23(7) and (8), the discharger,

(a) shall control the quality of the stream to ensure that the pH value of any sample collected at the alternate sampling point on the stream is within the range of 6.0 to 9.5; and

(b) need not comply with subsection (7) with respect to the stream.

Lethality Limits

16. Each discharger shall control the quality of each process effluent monitoring stream, each process effluent batch monitoring stream, each cooling water effluent monitoring stream and each combined effluent monitoring stream at the discharger's plant, for which a sampling point for lethality limits has been designated in Schedule 5, to ensure that each rainbow trout acute lethality test and each Daphnia magna acute lethality test performed on any grab sample collected at the designated sampling points for lethality limits at the plant, results in mortality for no more than fifty percent of the test organisms in one-hundred percent effluent.

PART V - MONITORING - CHEMICAL PARAMETERS

Monitoring - General

17.-(1) Despite sections 18 to 28 and 30, a discharger need not collect samples from any stream at the discharger's plant on a day on which there is no process effluent that is being discharged from the plant.

(2) Where a discharger is required by this Regulation to pick up a set of samples and analyze it for certain parameters the discharger shall pick up a set of samples sufficient to allow all the analyses to be performed.

(3) A discharger shall use all reasonable efforts to ensure that all analyses required by this Regulation are completed as soon as reasonably possible and that the results of those analyses are made available to the discharger as soon as reasonably possible.

(4) Subject to subsection (5), if a discharger is required or permitted in the Ministry of Environment and Energy publication entitled "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater", dated August, 1994, to collect a composite sample for any sample required to be picked up at the discharger's plant under section 18, 19, 20, 24 or 25, the discharger shall pick up the composite sample between the hours of 7.00 a.m. and 10.00 a.m..

(5) If the Director is satisfied, on the basis of written submissions from a discharger, that the circumstances at the discharger's plant are such that it would be impractical to pick up composite samples from each process effluent sampling point, each cooling water effluent sampling point and each combined effluent sampling point at the plant within the time period specified in subsection (4), the Director may give the discharger a written notice in respect of the plant, varying the time period specified in subsection (4).

(6) Subject to subsections (7) and (8), where a discharger is required by section 18, 19, 20, 24 or 25 to pick up a set of samples the discharger shall pick up a set collected over the twenty-four hour period immediately preceding the pick-up.

(7) The twenty-four hour period referred to in subsection (6) may be shortened or enlarged by up to three hours to permit a discharger to take advantage of the three hour range specified in subsection (4) or of a different three hour period specified in a notice under subsection (5).

(8) Where a notice has been given under subsection (5) in respect of a plant specifying a time period longer than three hours, the twenty-four hour period referred to in subsection (6) may be shortened or enlarged by up to that longer amount of time to permit the discharger to take advantage of the time period specified in the notice.

(9) If the circumstances at a plant change so that the Director is satisfied that the circumstances described in subsection (5) no longer apply at the plant, the Director may revoke a notice given in respect of a plant under subsection (5) by giving a notice of revocation in writing to a discharger for the plant.

Monitoring - Process Effluent - Daily

18.-(1) Each discharger for which a process effluent sampling point is specified in Schedule 2 for the discharger's plant shall, on each day, pick up a set of samples collected at each process effluent sampling point at the plant and shall analyze each set of samples for the parameters for which the frequency of monitoring, as set out in column 2 of Schedule 2 for the discharger's plant, is daily.

(2) Each discharger for which a process effluent sampling point is specified in Schedule 3 for the discharger's plant shall, on each day, pick up a set of samples collected at each process effluent sampling point at the plant and shall analyze each set of samples for the parameters listed in column 1 of Schedule 3 and specified for the sampling point in the column for that sampling point in the Schedule, for which the frequency of monitoring, as set out in column 2 of Schedule 2, is daily.

(3) Despite subsections (1) and (2), where for twelve consecutive months, the monthly average plant loading of a limited parameter is equal to or less than seventy-five percent of the monthly average plant loading limit for the parameter as set out in Column 4 of Schedule 2 for the discharger's plant, the discharger may reduce the frequency of monitoring for that parameter from daily to three times per week.

(4) Subsection (3) ceases to apply and the discharger shall monitor in accordance with subsections (1) and (2), where the daily plant loading limit for a limited parameter as set out in Column 3 of Schedule 2 for the discharger's plant is exceeded more then twice or the monthly average plant loading limit for a limited parameter as set out in Column 4 of Schedule 2 for the discharger's plant is exceeded more than once during any twelve consecutive months.

(5) Where a discharger changes the frequency of monitoring at the discharger's plant under subsections (3) or (4), the discharger shall notify the Director in writing within thirty days after the day on which a change occurs.

(6) A discharger need not meet the requirements of subsections (1) or (2) where it is impossible to do so because of sampling by a provincial officer.

Monitoring - Process Effluent - Weekly

19.-(1) Each discharger for which a process effluent sampling point is specified in Schedule 2 for the discharger's plant shall, on one day in each week, pick up a set of samples collected at each process effluent sampling point at the plant and shall analyze each set of samples for the parameters for which the frequency of monitoring, as set out in column 2 of Schedule 2 for the discharger's plant, is weekly.

(2) Each discharger for which a process effluent sampling point is specified in Schedule 3 for the discharger's plant shall, on one day in each week, pick up a set of samples collected at each process effluent sampling point at the plant and shall analyze each set of samples for the parameters listed in column 1 of Schedule 3 and specified for the sampling point in the column for that sampling point in the Schedule, for which the frequency of monitoring, as set out in column 2 of Schedule 2, is weekly.

(3) There shall be an interval of at least four days between successive pick-up days at the plant under this section.

(4) All samples picked up under this section in a week shall be picked up on the same day in the week.

Monitoring - Process Effluent - Quarterly

20.-(1) Each discharger for which a process effluent sampling point is specified in Schedule 2 for the discharger's plant shall, on one day in each quarter, on a day on which samples are picked up at the plant under section 19, pick up a set of samples collected at each process effluent sampling point at the plant and shall analyze each set of samples for the parameters for which the frequency of monitoring, as set out in column 2 of that Schedule, is quarterly.

(2) Each discharger for which a process effluent sampling point is specified in Schedule 3 for the discharger's plant shall, on one day in each quarter, on a day on which samples are picked up at the plant under section 19, pick up a set of samples collected at each process effluent sampling point at the plant and shall analyze each set of samples for the parameters listed in column 1 of Schedule 3 and specified for the sampling point in the column for that sampling point in the Schedule, for which the frequency of monitoring, as set out in column 2 of Schedule 2, is quarterly.

(3) There shall be an interval of at least forty-five days between successive pick-up days at the plant under this section.

(4) All samples picked up under this section in a quarter shall be picked up on the same day in the quarter.

Monitoring - Process Effluent - Batch

21.-(1) Each discharger for which a process effluent batch sampling point is specified in Schedule 3 for the discharger's plant, shall, for each batch of process effluent that flows past a process effluent batch sampling point, pick up a set of samples collected at the process effluent batch sampling point and analyze each set of samples for the parameters listed in column 1 of Schedule 3 and specified for the sampling point in the column for that sampling point in the Schedule.

(2) Where a discharger is required by subsection (1) to pick up a set of samples at a process effluent batch sampling point, the discharger shall pick up a set collected over the period during which the batch of process effluent flows past the sampling point.

Monitoring - Process Effluent - Quality Control

22.-(1) On one day in each year after ____, on a day on which samples are picked up at the plant under sections 19 and 20, each discharger for which a process effluent sampling point is specified in Schedule 2 for the discharger's plant shall collect and pick up a duplicate sample for each sample picked up on that day under sections 19 and 20 at one process effluent sampling point at the discharger's plant and shall analyze each duplicate sample for each parameter for which the frequency of monitoring, as set out in column 2 of Schedule 2 for the discharger's plant, is weekly or quarterly.

(2) On one day in each year after ____, on a day on which samples are picked up at the plant under sections 19 and 20, each discharger for which a process effluent sampling point is specified in Schedule 3 for the discharger's plant shall do the following:

1. Determine which one of the process effluent sampling points at the plant has the greatest number of parameters listed in column 1 of Schedule 3 and specified for the sampling point in the column for that sampling point in the Schedule, for which the frequency of monitoring, as set out in column 2 of Schedule 2, is weekly or quarterly.

2. Collect and pick up a duplicate sample for each sample picked up on that day under sections 19 and 20 at the process effluent sampling point described in paragraph 1.

3. Analyze each duplicate sample for each parameter specified for the process effluent sampling point described in paragraph 1 for which the frequency of monitoring, as set out in column 2 of Schedule 2, is weekly or quarterly.

(3) Each discharger shall prepare a travelling blank and a travelling spiked blank sample for each sample for which a duplicate sample is picked up at the plant under this section and shall analyze the travelling blank and travelling spiked blank samples in accordance with the directions set out in the Ministry of Environment and Energy publication entitled "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater", dated August, 1994.

(4) There shall be an interval of at least six months between successive pick-up days at the plant under this section.

Monitoring - Process Effluent - pH Measurement

23.-(1) Each discharger shall, on each day during the time period applicable to the plant under subsection 17(4) or (5), collect a grab sample from each process effluent sampling point at the discharger's plant and shall analyze each sample for the parameter pH.

(2) Each discharger shall, within each twenty-four hour period beginning with the collection of the first grab sample at the plant under subsection (1) on each day, collect two more grab samples from each process effluent sampling point at the discharger's plant and shall analyze each sample for the parameter pH.

(3) There shall be an interval of at least four hours between each of the three collections at a sampling point under subsections (1) and (2) in each twenty-four hour period.

(4) Each grab sample collected under subsections (1) and (2) shall be picked up within twenty-four hours of when it was collected.

(5) Instead of complying with subsections (1) to (4) with respect to a sampling point on a stream, a discharger may use an on-line analyzer at the sampling point on the stream and analyze the effluent at the sampling point for the parameter pH once in each day during the time period applicable to the plant under subsection 17(4) or (5), and two more times in each twenty-four hour period beginning with the first analysis at the plant under this subsection in each day.

(6) There shall be an interval of at least four hours between each of the three analyses at a sampling point under subsection (5) in each twenty-four hour period.

(7) For the purposes of subsections (1) to (6), a discharger may use an alternate sampling point located downstream of the sampling point established on the stream and specified for the plant under this Regulation but before the point of discharge of the stream to surface water or to an industrial sewer used in common with another plant.

(8) Before using an alternate sampling point under subsection (7), a discharger shall give the Director a written notice setting out the name, number and location of the alternate sampling point, together with a plot plan showing the alternate sampling point.

(9) Each discharger shall, for each batch of process effluent that flows past a process effluent batch sampling point at the discharger's plant, collect a composite sample from the process effluent batch sampling point and analyze the sample for the parameter pH.

(10) Each composite sample collected under subsection (9) shall be picked up over the period during which the batch of process effluent flows past the process effluent batch sampling point.

Monitoring - Cooling Water Effluent - Weekly Assessment

24. Each discharger shall, on one day in each week, on the day on which samples are picked up at the plant under section 19 for the week, pick up a set of samples collected at each cooling water effluent sampling point at the discharger's plant and shall analyze each set of samples for each assessment parameter.

Monitoring - Combined Effluent - Weekly Assessment

25. Each discharger shall, on one day in each week, on the day on which samples are picked up at the plant under section 19 for the week, pick up a set of samples collected at each combined effluent sampling point at the discharger's plant and shall analyze each set of samples for each assessment parameter.

Monitoring - Cooling Water Effluent and Combined Effluent - pH and Specific Conductance Measurement

26.-(1) Each discharger shall, on one day in each week, on the day on which samples are picked up at the plant under section 19 for the week, collect a grab sample from each cooling water effluent sampling point at the discharger's plant, during the time period applicable under subsection 17(4) or (5) to composite samples at the plant, and analyze each sample for the parameter pH.

(2) Each discharger shall, within the twenty-four hour period beginning with the collection of the first grab sample at the plant under subsection (1) for the week, collect two more grab samples from each cooling water effluent sampling point at the discharger's plant and shall analyze each sample for the parameter pH.

(3) There shall be an interval of at least four hours between each of the three collections at a sampling point under subsections (1) and (2) in each twenty-four hour period.

(4) Each grab sample collected under subsections (1) and (2) shall be picked up within twenty-four hours of when it was collected.

(5) Instead of complying with subsections (1) to (4) with respect to a sampling point on a stream, a discharger may use an on-line analyzer at the sampling point on the stream and analyze the effluent at the sampling point for the parameter pH on one day in each week, on the day on which samples are picked up at the plant under section 19 for the week, during the time period applicable under subsection 17(4) or (5) to composite samples at the plant, and two more times in each twenty-four hour period beginning with the first analysis at the plant under this subsection for the week.

(6) There shall be an interval of at least four hours between each of the three analyses at a sampling point under subsection (5) in each twenty-four hour period.

(7) Subsections (1) to (6) apply with necessary modifications to each combined effluent sampling point and, for the purpose, the reference in subsections (1) and (2) to each cooling water effluent sampling point shall be deemed to be a reference to each combined effluent sampling point.

(8) Subsections (1) to (7) apply with necessary modifications to the parameter specific conductance and, for the purpose, a reference in those subsections to pH shall be deemed to be a reference to specific conductance.

PART VI - MONITORING - ACUTE LETHALITY AND CHRONIC TOXICITY

Monitoring - Acute Lethality Testing - Rainbow Trout

27.-(1) Where a discharger is required by this section to perform a rainbow trout acute lethality test, the discharger shall perform the test according to the procedures described in the Environment Canada publication entitled "Biological Test Method: Reference Method for Determining Acute Lethality of Effluents to Rainbow Trout", dated July, 1990.

(2) Each rainbow trout acute lethality test required by this section shall be carried out as a single concentration test using one hundred percent effluent.

(3) On one day in each month, on a day on which samples are picked up at the plant under section 19, each discharger shall collect and immediately pick up a grab sample at each process effluent sampling point at the discharger's plant and shall perform a rainbow trout acute lethality test on each sample.

(4) There shall be an interval of at least fifteen days between successive pick-up days at the plant under subsection (3).

(5) All samples picked up under subsection (3) in a month shall be picked up on the same day in the month.

(6) Where a discharger has performed tests under subsection (3) for twelve consecutive months on samples collected from the same sampling point and the mortality of the rainbow trout in each test did not exceed fifty percent, the discharger is relieved of the obligations under subsection (3) relating to the sampling point and shall instead collect and immediately pick up a grab sample at the sampling point on one day in each quarter and perform a rainbow trout acute lethality test on each sample.

(7) Samples picked up at a plant under subsection (6) shall be picked up on a day on which samples are picked up at the plant under subsection (3).

(8) If no samples are being picked up at a plant under subsection (3) during a quarter, samples picked up at the plant during the quarter under subsection (6) shall be picked up on a day on which samples are picked up at the plant under section 19.

(9) There shall be an interval of at least forty-five days between successive pick-up days at the plant under subsection (6).

(10) All samples picked up under subsection (6) in a quarter shall be picked up on the same day in the quarter.

(11) If a rainbow trout acute lethality test performed under subsection (6) on any sample from a sampling point results in mortality of more than fifty percent of the test rainbow trout, subsections (6) to (10) cease to apply in respect to samples from that sampling point, and a discharger shall instead comply with the requirements of subsection (3) relating to the sampling point, until the tests performed under subsection (3) on all samples collected from the sampling point for a further twelve consecutive months result in mortality for no more than fifty per cent of the rainbow trout for each test.

(12) Subsections (2) to (11) apply with necessary modifications to each cooling water effluent sampling point and, for the purpose, the reference in subsection (3) to each process effluent sampling point shall be deemed to be a reference to each cooling water effluent sampling point and the reference in subsections (3) and (8) to section 19 shall be deemed to be a reference to subsection 24(1).

(13) Subsections (2) to (11) apply with necessary modifications to each combined effluent sampling point and, for the purpose, the reference in subsection (3) to each process effluent sampling point shall be deemed to be a reference to each combined effluent sampling point and the reference in subsections (3) and (8) to section 19 shall be deemed to be a reference to subsection 25(1).

(14) For each process effluent batch sampling point at the discharger's plant the discharger shall, on one day in each month, on a day on which samples are picked up at the plant under section 21 at the process effluent batch sampling point, collect and immediately pick up a grab sample at the process effluent batch sampling point, and perform a rainbow trout acute lethality test on the sample.

(15) Where a discharger has performed twelve consecutive tests under subsection (14) on samples collected from the same sampling point and the mortality of the rainbow trout in each test did not exceed fifty percent, the discharger is relieved of the obligations under subsection (14) relating to the sampling point and shall instead collect and immediately pick up a grab sample at the sampling point on one day in each quarter, on a day on which samples are picked up at the plant under section 21 at the sampling point, and perform a rainbow trout acute lethality test on the sample.

(16) If a rainbow trout acute lethality test performed under subsection (15) on any sample from a sampling point results in mortality of more than fifty percent of the test rainbow trout, subsection (15) ceases to apply in respect to samples from that sampling point, and a discharger shall instead comply with the requirements of subsection (14) relating to the sampling point, until the tests performed under subsection (14) on all samples collected from the sampling point for a further twelve consecutive tests result in mortality for no more than fifty per cent of the rainbow trout for each test.

(17) A discharger shall notify the Director in writing of any change in the frequency of acute lethality testing under this Regulation at the discharger's plant, within thirty days after the day on which the change begins.

(18) A discharger may notify the Director in writing of any period in which the testing of samples collected at a sampling point under this section would always result in mortality of more than fifty percent of the test rainbow trout.

(19) Where a notice is given under subsection (18), a discharger is relieved of the obligations under this section relating to the sampling point during the period in which the testing of samples collected at the sampling point would always result in mortality of more than fifty percent of the test rainbow trout.

(20) Subsections (18) and (19) are revoked on ______, 19__.

(The date that is 3 years after the day on which the Regulation is filed will be inserted in subsection 27(20)).

Monitoring - Acute Lethality Testing - Daphnia magna

28.-(1) Where a discharger is required by this section to perform a Daphnia magna acute lethality test, the discharger shall perform the test according to the procedures described in the Environment Canada publication entitled "Biological Test Method: Reference Method for Determining Acute Lethality of Effluents to Daphnia magna", dated July, 1990.

(2) Subsections 27(2) to (20) apply with necessary modifications to Daphnia magna acute lethality tests and, for the purpose, a reference to rainbow trout shall be deemed to be a reference to Daphnia magna.

(3) Each discharger shall pick up each set of samples required to be collected from a sampling point at the discharger's plant under this section on a day on which the discharger collects a sample from the sampling point under section 27, to the extent possible having regard to the frequency of monitoring required at the sampling point under this section and section 27.

Assessment Monitoring - Acute Lethality

29.-(1) If a rainbow trout acute lethality test performed under section 27 on a sample picked up at a Schedule 2 or a Schedule 3 sampling point results in mortality of more than 50 percent of the test rainbow trout three times in twelve consecutive months, a discharger shall prepare a Rainbow Trout Toxicity Elimination Report.

(2) If a Daphnia magna lethality test performed under section 28 on a sample picked up at a Schedule 2 or a Schedule 3 sampling point results in mortality of more than 50 percent of the test Daphnia magna three times in twelve consecutive months, the discharger shall prepare a Daphnia magna Toxicity Elimination Report.

(3) For the purposes of this section, a Rainbow Trout or Daphnia magna Toxicity Elimination Report shall set out the following information:

1. A description of the studies carried out by the discharger for determining the sources and causes of the acute lethality.
2. A detailed description of the methods by which the acute lethality could be eliminated, and an identification of which methods are technically feasible for implementing at the discharger's plant.
3. An estimate of the financial cost to the discharger of implementing each method identified as technically feasible under paragraph 2.
4. The timetable that would be required to implement each method identified as technically feasible under paragraph 2 and each of the stages involved in the implementation of each method.

(4) A Toxicity Elimination Report prepared under this section shall be submitted to the Director within twelve months of the date on which the third failed test was conducted that resulted in mortality of more than 50 percent of the test rainbow trout or Daphnia magna, as the case may be.

Monitoring - Chronic Toxicity Testing - Fathead Minnow and Ceriodaphnia dubia

30.-(1) Where a discharger is required to perform a 7-day fathead minnow growth inhibition test, the discharger shall perform the test according to the procedure described in the Environment Canada publication entitled "Biological Test Method: Test of Larval Growth and Survival Using Fathead Minnows" dated February, 1992.

(2) Where a discharger is required to perform a 7-day Ceriodaphnia dubia reproduction inhibition and survivability test, the discharger shall perform the test according to the procedure described in the Environment Canada publication entitled "Biological Test Method: Test of Reproduction and Survival Using the Cladoceran Ceriodaphnia dubia", dated February, 1992.

(3) On one day in each semi-annual period, on a day on which samples are picked up at the plant under section 19, each discharger shall collect and immediately pick up a grab sample from each sampling point designated in Schedule 6 at the discharger's plant, and shall perform a 7-day fathead minnow growth inhibition test and a 7-day Ceriodaphnia dubia reproduction inhibition and survivability test on each sample.

(4) There shall be an interval of at least ninety days between successive pick-up days at the plant under subsection (3).

(5) All samples picked up under subsection (3) in a semi-annual period shall be picked up on the same day in the semi-annual period.

(6) A discharger need not collect a sample from a sampling point in accordance with this section until twelve consecutive monthly rainbow trout acute lethality tests and twelve consecutive monthly Daphnia magna acute lethality tests performed on samples collected at the sampling point at a discharger's plant result in mortality for no more than fifty percent of the test organisms in one hundred percent effluent.

PART VII - EFFLUENT VOLUME

Flow Measurement

31.-(1) Subject to subsection (5), for the purposes of this section, a volume of effluent for a stream for a day is the volume that flowed past the sampling point on the stream during the twenty-four hour period preceding the pick-up of the first sample picked up from the stream for the day.

(2) Each discharger shall determine in cubic metres a daily volume of effluent for each process effluent monitoring stream at the discharger's plant for each day on which a sample is collected under this Regulation from the stream, by integration of continuous flowrate measurements.

(3) Despite subsection (2), where a process effluent monitoring stream discharges on an intermittent basis, the daily volumes for the stream may be determined either by integration of continuous flowrate measurements or by the summation of the individual intermittent volume measurements.

(4) Each discharger shall use flow measurement methods that allow the daily volumes for process effluent monitoring streams to be determined to an accuracy of within plus or minus fifteen percent.

(5) For the purposes of subsection (6), a batch volume of effluent for a process effluent batch monitoring stream is the volume that flowed past the process effluent batch sampling point on the stream during the period of flow of the batch of effluent past the sampling point.

(6) Each discharger shall determine in cubic metres a batch volume of effluent for each process effluent batch monitoring stream at the discharger's plant for each batch for which a sample is collected under this Regulation from the stream, by integration of continuous flowrate measurements.

(7) Each discharger shall use flow measurement methods that allow the batch volumes for process effluent batch monitoring streams to be determined to an accuracy of within plus or minus fifteen percent.

(8) Each discharger shall determine in cubic metres a daily volume of effluent for each cooling water effluent monitoring stream at the discharger's plant for each day on which a sample is collected under this Regulation from the stream.

(9) Each discharger shall use flow measurement methods that allow the daily volumes for cooling water effluent monitoring streams to be determined to an accuracy of within plus or minus twenty percent.

(10) Each discharger shall determine in cubic metres a daily volume of effluent for each combined effluent monitoring stream at the discharger's plant for each day on which a sample is collected under this Regulation from the stream.

(11) Each discharger shall use flow measurement methods that allow the daily volumes for combined effluent monitoring streams to be determined to an accuracy of within plus or minus twenty percent.

(12) Each discharger shall, no later than the day that this section comes into force, determine by calibration or confirm by means of a certified report of a registered professional engineer of the Province of Ontario that,

(a) each flow measurement method used under subsections (2) and (3) meets the accuracy requirements of subsection (4);

(b) each flow measurement method used under subsection (6) meets the accuracy requirements of subsection (7);

(c) each flow measurement method used under subsection (8) meets the accuracy requirements of subsection (9); and

(d) each flow measurement method used under subsection (10) meets the accuracy requirements of subsection (11).

(13) Where a discharger uses a new flow measurement method or alters an existing flow measurement method, the discharger shall determine by calibration or confirm by means of a certified report of a registered professional engineer of the Province of Ontario that each new or altered flow measurement method meets the accuracy requirements of subsections (4), (7), (9) or (11), as the case may be, within two weeks after the day on which the new or altered method or system is used.

(14) Each discharger shall develop and implement a maintenance schedule and a calibration schedule for each flow measurement system installed at the discharger's plant and shall maintain each flow measurement system according to good operating practices.

(15) Each discharger shall use reasonable efforts to set up each flow measurement system used for the purposes of this section in a way that permits inspection by a provincial officer.

Calculation of Plant Volumes

32.-(1) Each discharger shall calculate, in cubic metres, a daily process effluent plant volume for each day.

(2) For the purposes of subsection (1), a process effluent plant volume for a day is the sum of the daily process effluent volumes determined under section 31 for the day.

(3) Each discharger shall calculate, in cubic metres, a monthly average process effluent plant volume for each month, by taking the arithmetic mean of the daily process effluent plant volumes calculated under subsection (1) for the month.

(4) Each discharger shall calculate, in cubic metres, a daily cooling water effluent plant volume for each day.

(5) For the purposes of subsection (4), a cooling water effluent plant volume for a day is the sum of the daily cooling water volumes determined under section 31 for the day.

(6) Each discharger shall calculate, in cubic metres, a monthly average cooling water effluent plant volume for each month, by taking the arithmetic mean of the daily cooling water effluent plant volumes calculated under subsection (4) for the month.

(7) Each discharger shall calculate, in cubic metres, a daily combined effluent plant volume for each day.

(8) For the purposes of subsection (7), a combined effluent plant volume for a day is the sum of the daily combined effluent volumes determined under section 31 for the day.

(9) Each discharger shall calculate, in cubic metres, a monthly average combined effluent plant volume for each month, by taking the arithmetic mean of the daily combined effluent plant volumes calculated under subsection (7) for the month.

PART VIII - STORM WATER CONTROL

Storm Water Control Study

33.-(1) Each discharger shall complete a storm water control study in respect of the discharger's plant, in accordance with the requirements of the Ministry of Environment and Energy publication entitled "Protocol for Conducting a Storm Water Control Study", dated August, 1994.

(2) A discharger need not comply with subsection (1) in respect of the discharger's plant if,

(a) the plant meets the exemption criteria set out in the Ministry of Environment and Energy publication entitled "Protocol for Conducting a Storm Water Control Study," dated August, 1994; and

(b) the discharger notifies the Director in writing, by _____________, 19__, that the plant meets the exemption criteria referred to in clause (a).

(The date that is one year after the day on which this Regulation is filed will be inserted in clause 33(2)(b)).

(3) Subject to subsection (4), a discharger shall complete the storm water control study in respect of the discharger's plant by ________, 19__.

(The date that is two years after the day on which this Regulation is filed will be inserted in subsection 33(3)).

(4) A discharger may postpone completion of the storm water control study in respect of the discharger's plant until _______, 19__ if,

(a) in order to meet the requirements of Part IV, the discharger plans to make process changes, install waste water treatment facilities, implement management practices, or make any other changes at the plant that would likely alter the quantity or quality of storm water discharged from the plant; and

(b) the discharger notifies the Director in writing, by ________, 19__, of the plans referred to in clause (a).

(The date that is two years after the day on which this Regulation is filed will be inserted in clause 33(4)(b)).

(5) Each discharger shall ensure that a copy of each study completed under this section is available to Ministry staff at the discharger's plant, on request during the plant's normal office hours.

PART IX - RECORDS AND REPORTS

Record Keeping

34.-(1) Each discharger shall keep records, in an electronic format acceptable to the Director, of all analytical results obtained under sections 18 to 21 and 23 to 26, all calculations performed under sections 10, 11, 12, 13 and 14, and all determinations and calculations made or performed under sections 31 and 32.

(2) Each discharger shall keep records of all sampling and analytical procedures used in meeting the requirements of section 7, including, for each sample, the date, the time of pick-up, the sampling procedures used, and any incidents likely to affect the analytical results.

(3) Each discharger shall keep records of the results of all monitoring performed under sections 22, 27, 28 and 30.

(4) Each discharger shall keep records of all maintenance and calibration procedures performed under section 31.

(5) Each discharger shall keep records of all problems or malfunctions, including those related to sampling, analysis, acute lethality testing, chronic toxicity testing or flow measurement, that result or are likely to result in a failure to comply with a requirement of this Regulation, stating the date, duration and cause of each malfunction, and including a description of any remedial action taken.

(6) Each discharger shall keep records of any incident in which process effluent is discharged from the discharger's plant without flowing past a process effluent sampling point or a process effluent batch sampling point at the plant before being discharged, stating the date, duration, cause and nature of each incident.

(7) Each discharger shall keep records of all process changes and redirections of or changes in the character of effluent streams that affect the quality of effluent at any sampling point specified for the discharger's plant under this Regulation.

(8) Beginning on ________, 19___, each discharger shall keep records of the monthly average daily production, in tonnes, of each product listed in Schedule 7 for the discharger's plant, for each month.

(The day that is the first day of the month after the month on which the Regulation comes into force will be inserted in subsection (8)).

(9) For the purposes of subsection (8), the monthly average daily production of a product for a month at the discharger's plant is the amount of the product, calculated in tonnes, that is produced at the discharger's plant during the month, divided by the number of days in the month in which the product is produced at the plant.

(10) Each discharger shall keep records of the reference daily rate of production, in tonnes, of each product listed in Schedule 7 for the discharger's plant.

(11) For the purposes of subsection (10), the reference daily rate of production of a product at the discharger's plant is the arithmetic mean of the amounts calculated under subsection (8) for the product for the first twelve months for which the discharger is required to keep a record under subsection (8).

(12) Subject to subsection (13), each discharger shall make each record required by this section as soon as reasonably possible and shall keep each such record for a period of three years.

(13) Each discharger shall keep each record required by subsection (10) for a period of ten years.

(14) Each discharger shall ensure that all records kept under this section are available to Ministry staff at the discharger's plant, on request during the plant's normal office hours.

Reports Available to the Public

35.-(1) On or before June 1 in each year, each discharger shall prepare a report relating to the previous calendar year and including,

(a) a summary of plant loadings calculated under sections 10, 12 and 13;

(b) a summary of batch loadings calculated under section 11;

(c) a summary of process effluent loading contributions calculated under section 14;

(d) a summary of the results of monitoring performed under sections 18 to 21, 23 to 28 and 30;

(e) a summary of calculations performed under subsections 32(1), (4) and (7);

(f) a summary of the loadings, concentrations or other results that exceeded a limit prescribed by section 15 or 16; and

(g) a summary of the incidents in which process effluent was discharged from the discharger's plant without flowing past a process effluent sampling point or a process effluent batch sampling point at the plant before being discharged.

(2) Each discharger shall ensure that each report prepared under subsection (1) is available to any person at the discharger's plant, on request during the plant's normal office hours.

(3) Each discharger shall provide the Director, upon request, with a copy of any report that the discharger has prepared under subsection (1).

Reports to the Director - General

36.-(1) Each discharger shall notify the Director in writing of any change of name or ownership of the discharger's plant occurring after _______, 19___, within thirty days after the end of the month in which the change occurs.

(The date that is the day on which this Regulation is filed will be inserted in subsection 36(1)).

(2) Each discharger shall notify the Director in writing of any process change or redirection of or change in the character of an effluent stream that affects the quality of effluent at any sampling point specified for the discharger's plant under this Regulation, within thirty days of the change or redirection.

(3) A discharger need not comply with subsection (2) where the effect of the change or redirection on effluent quality is of less than one week's duration.

(4) Each discharger shall notify the Director in writing if the discharger's plant has, for three consecutive months, produced a product listed in Schedule 7 for the discharger's plant at less than seventy-five percent of the reference daily rate of production calculated under subsection 34(10) for the product, within thirty days after the end of the three month period.

Reports to the Director - Compliance with Section 6 and Part IV

37.-(1) Each discharger shall report to the Director any incident in which process effluent is discharged from the discharger's plant without flowing past a process effluent sampling point or a process effluent batch sampling point at the plant before being discharged.

(2) Each discharger shall report any loading, concentration or other result that exceeds a limit prescribed by section 15 or 16.

(3) A report required under subsection (1) or (2) shall be given orally, as soon as reasonably possible, and in writing, as soon as reasonably possible.

Quarterly Reports to the Director

38.-(1) No later than forty-five days after the end of each quarter, each discharger shall submit a report to the Director containing information relating to the discharger's plant throughout the quarter as required by subsections (3) to (14).

(2) A report under this section shall be submitted both in an electronic format acceptable to the Director and in hard copy generated from the electronic format and signed by the discharger.

(3) A report under this section shall include all information included in a report given under section 37 during the quarter.

(4) Each discharger shall report, for each month in the quarter, the monthly average plant loadings and the highest and lowest daily plant loadings calculated under section 10, 12 and 13 for each limited parameter and each assessment parameter.

(5) Each discharger shall report, for each month in the quarter, the highest and lowest batch loadings calculated under section 11 for each limited parameter.

(6) Each discharger shall report, for each month in the quarter, the monthly average process effluent loading contributions and the highest and lowest daily process effluent loading contributions calculated under section 14 for each common parameter.

(7) Each discharger shall report, for each month in the quarter, the monthly average process effluent plant volume and the highest and lowest daily process effluent plant volumes calculated under section 32.

(8) Each discharger shall report, for each month in the quarter, the highest and lowest process effluent batch volumes calculated under section 31.

(9) Each discharger shall report, for each month in the quarter, the monthly average cooling water effluent plant volume and the highest and lowest daily cooling water effluent plant volumes calculated under section 32.

(10) Each discharger shall report, for each month in the quarter, the monthly average combined effluent plant volume and the highest and lowest daily combined effluent plant volumes calculated under section 32.

(11) Each discharger shall report, for each process effluent monitoring stream at the discharger's plant, the number of days in each month in the quarter in which process effluent flowed past the process effluent sampling point on the stream.

(12) Each discharger shall report, for each process effluent batch monitoring stream at the discharger's plant, the number of batches of process effluent in each month in the quarter that flowed past the process effluent batch sampling point on the stream.

(13) Each discharger shall report, for each month in the quarter, the highest and lowest pH results obtained under section 23 for each process effluent monitoring stream and each process effluent batch monitoring stream at the discharger's plant.

(14) Each discharger shall report, for each month in the quarter, the highest and lowest pH results and specific conductance results obtained under section 26 for each cooling water effluent monitoring stream and each combined effluent monitoring stream at the discharger's plant.

Reports to the Director - Chronic Toxicity Testing

39.-(1) Each discharger shall report to the Director the results of all monitoring performed under section 30, together with the date on which each sample was picked up, no later than forty-five days after the end of each semi-annual period in which the monitoring was performed.

(2) A report under subsection (1) shall include a plot of percentage reduction in growth or reproduction against the logarithm of test concentration and shall include a calculation of the concentration at which a 25 per cent reduction in growth or reproduction would occur.

PART X - COMMENCEMENT AND REVOCATION PROVISIONS

Revocation of O.Reg. **209/89**

40. Ontario Regulations 209/89, 532/89, 45/90, and 416/90 are revoked on _______, 19__.

(The date that is 90 days after the day on which this Regulation is filed will be inserted in section 40).

Commencement of Parts IV, V, VI and VII

41.-(1) Part IV comes into force on ______, 19__.

(The date that is 3 years after the day on which this Regulation is filed will be inserted in subsection 41(1)).

(2) Parts V, VI and VII come into force on _______, 19__.

(The date that is 90 days after the day on which this Regulation is filed will be inserted in subsection 41(2)).

SCHEDULE 1
LIST OF REGULATED PLANTS

PLANT NAME	LOCATION	OWNER AS OF May 1, 1994
Amoco Canada Resources Ltd.	Sarnia	Amoco Canada Resources Ltd.
BASF Canada Inc. (Fibres)	Arnprior	BASF Canada Inc.
BASF Canada Inc. (Dispersions)	Sarnia	BASF Canada Inc.
Celanese Canada Inc.	Millhaven	Celanese Canada Inc.
Chinook Group Limited	Sombra	Chinook Group Limited
Cornwall Chemicals Ltd.	Cornwall	Cornwall Chemicals Ltd.
Dow Chemical Canada Inc. - Vidal Street	Sarnia	Dow Chemical Canada Inc.
Dow Chemical Canada Inc. - Scott Road	Sarnia	Dow Chemical Canada Inc.
Dow Chemical Canada Inc. - LaSalle Rd.	Sarnia	Dow Chemical Canada Inc.
Du Pont Canada Inc.	Corunna	Du Pont Canada Inc.
Du Pont Canada Inc.	Kingston	Du Pont Canada Inc.
Du Pont Canada Inc.	Maitland	Du Pont Canada Inc.
Du Pont Canada Inc.	Whitby	Du Pont Canada Inc.
Ethyl Canada Inc.	Sarnia	Ethyl Canada Inc.
G.E. Plastics Canada Ltd.	Cobourg	G.E. Plastics Canada Ltd.
Geon Canada Inc.	Welland	Geon Canada Inc.
Goodyear Canada Inc.	Bowmanville	Goodyear Canada Inc.
Guardsman Products Ltd.	Cornwall	Guardsman Products Ltd.
Imperial Oil Chemicals Division	Sarnia	Imperial Oil
Morbern Inc.	Cornwall	Morbern Inc.
Novacor Chemicals Ltd.	Mooretown	Novacor Chemicals Ltd.
Novacor Chemicals Ltd., Petrochemical	Sarnia	Novacor Chemicals Ltd.
OxyChem Durez Canada	Fort Erie	OxyChem Durez Canada
Polysar Rubber Corporation	Sarnia	Bayer AG (Germany)
Rohm & Haas Canada Inc.	Morrisburg	Rohm & Haas Canada Inc.
Rohm & Haas Canada Inc.	West Hill	Rohm & Haas Canada Inc.
Stepan Canada Ltd.	Longford Mills	Stepan Canada Ltd.
Uniroyal Chemical Ltd.	Elmira	Uniroyal Chemical Ltd.

Schedule 2

Process Effluent Limits and Monitoring Frequency

PLANT: Amoco Canada Resources Ltd. (Sarnia)				
ATG	Parameter	Monitoring Frequency	Daily Plant Loading Limit kg/day	Monthly Average Plant Loading Limit kg/day
	Column 1	Column 2	Column 3	Column 4
5	DOC	D	9.0	3.0
6	Total phosphorus	W	1.2	0.41
8	Total suspended solids	D	17	3.7
9	Aluminum	Q	1.1	-
9	Copper	Q	0.21	-
9	Molybdenum	W	0.38	0.16
9	Zinc	Q	0.17	-
10	Arsenic	Q	0.011	-
12	Mercury	Q	0.0010	-
14	Phenolics (4AAP)	W	0.0067	0.0023
15	Sulphide	W	0.12	0.044
16	1,2-Dichlorobenzene	W	0.16	0.056
17	Benzene	W	0.013	0.0051
25	Oil and grease	W	6.0	4.7

Explanatory Notes:

ATG	Analytical Test Group
TEQ	total toxic equivalent of 2,3,7,8 substituted dioxin and furan congeners
kg/day	kilograms per day
D	Daily monitoring requirement
W	Weekly monitoring requirement
Q	Quarterly monitoring requirement

Process Effluent Sampling Point Number, Name and Location as set out in the plot plan of the discharger, dated ____, 19__, and filed with the Ministry.

0100 = API Separator Effluent to River

Process Effluent Limits and Monitoring Frequency

PLANT:	Celanese Canada Inc. (Millhaven)			
ATG	Parameter	Monitoring Frequency	Daily Plant Loading Limit kg/day	Monthly Average Plant Loading Limit kg/day
	Column 1	Column 2	Column 3	Column 4
4	Ammonia plus Ammonium	W	55	20
4	Nitrate + Nitrite	W	110	41
4	Total Kjeldahl nitrogen	D	54	16
5	DOC	D	57	31
6	Total phosphorus	W	23	8.5
8	Total suspended solids	D	130	39
10	Antimony	W	1.5	0.53
14	Phenolics (4AAP)	W	0.032	0.0080
25	Oil and grease	W	42	14

Explanatory Notes:

ATG	Analytical Test Group
TEQ	total toxic equivalent of 2,3,7,8 substituted dioxin and furan congeners
kg/day	kilograms per day
D	Daily monitoring requirement
W	Weekly monitoring requirement
Q	Quarterly monitoring requirement

Process Effluent Sampling Point Number, Name and Location as set out in the plot plan of the discharger, dated ____, 19__, and filed with the Ministry.

0400 = Treatment Plant Effluent to Centre Outfall

Process Effluent Limits and Monitoring Frequency

PLANT: **Chinook Group Limited (Sombra)**

ATG	Parameter Column 1	Monitoring Frequency Column 2	Daily Plant Loading Limit kg/day Column 3	Monthly Average Plant Loading Limit kg/day Column 4
4	Ammonia plus Ammonium	W	1.5	0.48
4	Total Kjeldahl nitrogen	D	3.1	1.1
5	DOC	D	8.2	3.2
6	Total phosphorus	W	0.52	0.20
8	Total suspended solids	D	7.5	2.4
9	Chromium	W	0.021	0.0079
9	Zinc	W	0.066	0.023
25	Oil and grease	W	0.90	0.34
24	2,3,7,8-tetrachlorodibenzo-para-dioxin	Q		
	2,3,7,8-tetrachlorodibenzofuran	Q		
	TEQ	Q		

Explanatory Notes:

ATG	Analytical Test Group
TEQ	total toxic equivalent of 2,3,7,8 substituted dioxin and furan congeners
kg/day	kilograms per day
D	Daily monitoring requirement
W	Weekly monitoring requirement
Q	Quarterly monitoring requirement

Process Effluent Sampling Point Number, Name and Location as set out in the plot plan of the discharger, dated ____, 19__, and filed with the Ministry.

0100 = Sump Effluent to River

Process Effluent Limits and Monitoring Frequency

PLANT:	**Cornwall Chemicals Ltd. (Cornwall)**			
ATG	Parameter	Monitoring Frequency	Daily Plant Loading Limit kg/day	Monthly Average Plant Loading Limit kg/day
	Column 1	Column 2	Column 3	Column 4
5	DOC	D	10	4.7
6	Total phosphorus	Q	0.64	-
8	Total suspended solids	D	40	13
9	Aluminum	Q	0.83	-
9	Nickel	Q	0.88	-
9	Zinc	Q	0.50	-
12	Mercury	W	0.0042	0.0015
15	Sulphide	D	1.3	0.53
16	Carbon tetrachloride	D	0.042	0.011
23	Hexachloroethane	W	0.0027	0.00084
25	Oil and grease	W	8.7	4.5
24	2,3,7,8-tetrachlorodibenzo-para-dioxin	Q		
	2,3,7,8-tetrachlorodibenzofuran	Q		
	TEQ	Q		

Explanatory Notes:

ATG	Analytical Test Group
TEQ	total toxic equivalent of 2,3,7,8 substituted dioxin and furan congeners
kg/day	kilograms per day
D	Daily monitoring requirement
W	Weekly monitoring requirement
Q	Quarterly monitoring requirement

Process Effluent Sampling Point Number, Name and Location as set out in the plot plan of the discharger, dated ____, 19__, and filed with the Ministry.

0100 = Manhole 26 to River

Process Effluent Limits and Monitoring Frequency

PLANT: Dow Chemical Canada Inc. (Sarnia) - La Salle Road			
ATG	Parameter	Monitoring Frequency	Batch Loading Limit kg/batch
	Column 1	Column 2	Column 5
5	DOC	B	130
6	Total phosphorus	B	3.8
8	Total suspended solids	B	160
9	Aluminum	B	3.2
14	Phenolics (4AAP)	B	0.090
25	Oil and grease	B	12

Explanatory Notes:

ATG	Analytical Test Group
TEQ	total toxic equivalent of 2,3,7,8 substituted dioxin and furan congeners kg/batch kilograms per batch
B	Batch monitoring requirement
D	Daily monitoring requirement
W	Weekly monitoring requirement
Q	Quarterly monitoring requirement

Process Effluent Limits and Monitoring Frequency

PLANT: **Dow Chemical Canada Inc. (Sarnia) - Scott Road**

ATG	Parameter	Monitoring Frequency	Daily Plant Loading Limit kg/day	Monthly Average Plant Loading Limit kg/day
	Column 1	Column 2	Column 3	Column 4
4	Total Kjeldahl Nitrogen	W	1.7	0.62
5	DOC	D	27	6.1
6	Total phosphorus	W	0.14	0.053
8	Total suspended solids	W	2.6	1.3
9	Aluminum	Q	0.022	-
9	Boron	Q	1.7	-
12	Mercury	Q	0.000042	-
14	Phenolics (4AAP)	W	0.0062	0.0023
15	Sulphide	Q	0.010	-
16	1,1,2-Trichloroethane	W	0.021	0.0065
16	1,1-Dichloroethane	W	0.047	0.015
23	1,2,4-Trichlorobenzene	W	0.0030	0.0011
23	2,4,5-Trichlorotoluene	W	0.00043	0.00020
23	Hexachlorobenzene	Q	0.00010	-
23	Hexachlorobutadiene	W	0.00028	0.00020
23	Hexachloroethane	W	0.00028	0.00020
23	Octachlorostyrene	W	0.00021	0.00020
25	Oil and grease	W	1.8	1.4
24	2,3,7,8-tetrachlorodibenzo-para-dioxin	Q		
	2,3,7,8-tetrachlorodibenzofuran	Q		
	TEQ	Q		

Explanatory Notes:

ATG	Analytical Test Group
TEQ	total toxic equivalent of 2,3,7,8 substituted dioxin and furan congeners
kg/day	kilograms per day
D	Daily monitoring requirement
W	Weekly monitoring requirement
Q	Quarterly monitoring requirement

Process Effluent Sampling Point Number, Name and Location as set out in the plot plan of the discharger, dated ____, 19__, and filed with the Ministry.

2100 = Scott Road Treated Runoff to River

Process Effluent Limits and Monitoring Frequency

PLANT: **Dow Chemical Canada Inc. (Sarnia) - Vidal Street**

ATG	Parameter	Monitoring Frequency	Daily Plant Loading Limit kg/day	Monthly Average Plant Loading Limit kg/day
	Column 1	Column 2	Column 3	Column 4
4	Ammonia plus Ammonium	W	140	43
4	Nitrate + Nitrite	W	11	3.9
4	Total Kjeldahl nitrogen	D	78	22
5	DOC	D	190	73
6	Total phosphorus	W	21	7.0
8	Total suspended solids	D	640	230
9	Aluminum	W	25	8.9
14	Phenolics (4AAP)	W	0.94	0.30
16	1,2-Dichloroethane	W	0.51	0.18
16	1,2-Dichloropropane	W	1.9	0.62
16	Methylene chloride	Q	0.089	-
16	Tetrachloroethylene	W	0.11	0.041
16	Trichloroethylene	Q	0.055	-
16	Vinyl chloride	Q	0.58	-
17	Ethylbenzene	Q	0.055	-
19	Bis (2-chloroisopropyl)ether	Q	0.076	-
23	1,2,4-Trichlorobenzene	W	0.017	0.0056
23	1,2,4,5-Tetrachlorobenzene	W	0.0020	0.00075
23	2,4,5-Trichlorotoluene	W	0.0037	0.0016
23	Hexachlorobenzene	Q	0.0030	-
23	Hexachloroethane	W	0.00052	0.00033
25	Oil and grease	W	180	76

24	2,3,7,8-tetrachlorodibenzo-para-dioxin	Q
	2,3,7,8-tetrachlorodibenzofuran	Q
	TEQ	Q

Explanatory Notes:

ATG	Analytical Test Group
TEQ	total toxic equivalent of 2,3,7,8 substituted dioxin and furan congeners
kg/day	kilograms per day
D	Daily monitoring requirement
W	Weekly monitoring requirement
Q	Quarterly monitoring requirement

Process Effluent Limits and Monitoring Frequency

PLANT: **Du Pont Canada Inc. (Corunna)**

ATG	Parameter	Monitoring Frequency	Daily Plant Loading Limit kg/day	Monthly Average Plant Loading Limit kg/day
	Column 1	Column 2	Column 3	Column 4
5	DOC	W	440	220
6	Total phosphorus	Q	22	-
8	Total suspended solids	W	1300	570
9	Aluminum	Q	45	-
14	Phenolics (4AAP)	W	0.55	0.25
17	Toluene	Q	1.3	-
25	Oil and grease	W	460	170

Explanatory Notes:

ATG	Analytical Test Group
TEQ	total toxic equivalent of 2,3,7,8 substituted dioxin and furan congeners
kg/day	kilograms per day
D	Daily monitoring requirement
W	Weekly monitoring requirement
Q	Quarterly monitoring requirement

Process Effluent Sampling Point Number, Name and Location as set out in the plot plan of the discharger, dated ____, 19__, and filed with the Ministry:

0200 = Final Effluent to River

Process Effluent Limits and Monitoring Frequency

PLANT: **Du Pont Canada Inc. (Kingston)**

ATG	Parameter Column 1	Monitoring Frequency Column 2	Daily Plant Loading Limit kg/day Column 3	Monthly Average Plant Loading Limit kg/day Column 4
5	DOC	D	25	5.7
6	Total phosphorus	W	1.3	0.42
8	Total suspended solids	D	93	19
12	Mercury	Q	0.00036	-
14	Phenolics (4AAP)	W	0.0072	0.0035
19	Biphenyl	Q	0.014	-
19	Diphenyl ether	W	0.071	0.029
25	Oil and grease	W	7.5	2.9

Explanatory Notes:

ATG	Analytical Test Group
TEQ	total toxic equivalent of 2,3,7,8 substituted dioxin and furan congeners
kg/day	kilograms per day
D	Daily monitoring requirement
W	Weekly monitoring requirement
Q	Quarterly monitoring requirement

Process Effluent Sampling Point Number, Name and Location as set out in the plot plan of the discharger, dated ____, 19__, and filed with the Ministry.

0600 = Flake Effluent to Catch Tank

Process Effluent Limits and Monitoring Frequency

PLANT: **Du Pont Canada Inc. (Maitland)**

ATG	Parameter	Monitoring Frequency	Daily Plant Loading Limit kg/day	Monthly Average Plant Loading Limit kg/day
	Column 1	Column 2	Column 3	Column 4
2	Cyanide Total	W	5.5	2.1
4	Ammonia plus Ammonium	W	140	48
4	Nitrate + Nitrite	W	110	40
4	Total Kjeldahl nitrogen	D	320	93
5	DOC	D	710	360
6	Total phosphorus	W	21	8.0
8	Total suspended solids	D	650	210
9	Chromium	W	1.1	0.46
9	Cobalt	W	0.71	0.23
9	Copper	W	0.28	0.098
9	Vanadium	W	0.58	0.29
10	Arsenic	W	0.89	0.19
14	Phenolics (4AAP)	W	0.29	0.14
16	Tetrachloroethylene	D	1.0	0.61
23	Hexachlorobenzene	Q	0.0053	-
25	Oil and grease	W	120	46
24	2,3,7,8-tetrachlorodibenzo-para-dioxin	Q		
	2,3,7,8-tetrachlorodibenzofuran	Q		
	TEQ	Q		

Explanatory Notes:

ATG	Analytical Test Group
TEQ	total toxic equivalent of 2,3,7,8 substituted dioxin and furan congeners
kg/day	kilograms per day
D	Daily monitoring requirement
W	Weekly monitoring requirement
Q	Quarterly monitoring requirement

Process Effluent Limits and Monitoring Frequency

PLANT: **Du Pont Canada Inc. (Whitby)**

ATG	Parameter Column 1	Monitoring Frequency Column 2	Daily Plant Loading Limit kg/day Column 3	Monthly Average Plant Loading Limit kg/day Column 4
5	DOC	W	5.9	3.3
6	Total phosphorus	Q	0.26	-
8	Total suspended solids	W	13	6.5
14	Phenolics (4AAP)	W	0.016	0.0061
25	Oil and grease	W	4.3	1.7

Explanatory Notes:

ATG	Analytical Test Group
TEQ	total toxic equivalent of 2,3,7,8 substituted dioxin and furan congeners
kg/day	kilograms per day
D	Daily monitoring requirement
W	Weekly monitoring requirement
Q	Quarterly monitoring requirement

Process Effluent Sampling Point Number, Name and Location as set out in the plot plan of the discharger, dated ____, 19__, and filed with the Ministry.

0200 = Nylon Line Combined Effluent to River

Process Effluent Limits and Monitoring Frequency

PLANT: **Ethyl Canada Inc. (Sarnia)**

ATG	Parameter	Monitoring Frequency	Daily Plant Loading Limit kg/day	Monthly Average Plant Loading Limit kg/day	Batch Loading Limit kg/batch
	Column 1	Column 2	Column 3	Column 4	Column 5
4	Nitrate + Nitrite	W	0.30	0.15	-
5	DOC	D	0.30	0.087	3.6
6	Total phosphorus	Q	0.0050	-	0.28
8	Total suspended solids	D	0.46	0.10	11
9	Aluminum	D	0.35	0.17	7.4
9	Boron	-	-	-	2.8
9	Chromium	Q	0.0043	-	-
9	Lead	D	0.018	0.0035	2.4
9	Zinc	-	-	-	0.18
12	Mercury	Q	0.000017	-	0.0013
13	Total Alkyl Lead	-	-	-	1.1
14	Phenolics (4AAP)	W	0.00023	0.000078	0.0055
15	Sulphide	-	-	-	0.15
16	1,2-Dichloroethane	W	0.0071	0.0028	0.21
16	Ethylene dibromide	Q	0.0021	-	0.083
16	Methylene chloride	-	-	-	0.030
17	Toluene	W	0.00047	0.00010	0.0046
19	1-Methylnaphthalene	-	-	-	0.027
19	2-Methylnaphthalene	-	-	-	0.026
19	Acenaphthene	-	-	-	0.0090
19	Biphenyl	-	-	-	0.0085
19	Fluorene	-	-	-	0.0081
19	Indole	-	-	-	0.67
19	Naphthalene	-	-	-	0.013
19	Phenanthrene	-	-	-	0.0064
25	Oil and grease	W	0.17	0.13	8.2

Explanatory Notes:

ATG	Analytical Test Group
TEQ	total toxic equivalent of 2,3,7,8 substituted dioxin and furan congeners
kg/day	kilograms per day
kg/batch	kilograms per batch
D	Daily monitoring requirement
W	Weekly monitoring requirement
Q	Quarterly monitoring requirement

Process Effluent Limits and Monitoring Frequency

PLANT: **G.E. Plastics Canada Ltd. (Cobourg)**

ATG	Parameter	Monitoring Frequency	Daily Plant Loading Limit	Monthly Average Plant Loading Limit
			kg/day	kg/day
	Column 1	Column 2	Column 3	Column 4
2	Cyanide Total	Q	0.25	-
4	Ammonia plus Ammonium	W	3.1	1.9
4	Nitrate + Nitrite	W	12	4.6
4	Total Kjeldahl nitrogen	D	13	12
5	DOC	D	46	20
6	Total phosphorus	W	2.1	0.68
8	Total suspended solids	D	45	14
9	Aluminum	Q	0.84	-
10	Antimony	Q	0.16	-
14	Phenolics (4AAP)	W	0.026	0.011
25	Oil and grease	W	5.7	2.5

Explanatory Notes:

ATG	Analytical Test Group
TEQ	total toxic equivalent of 2,3,7,8 substituted dioxin and furan congeners
kg/day	kilograms per day
D	Daily monitoring requirement
W	Weekly monitoring requirement
Q	Quarterly monitoring requirement

Process Effluent Sampling Point Number, Name and Location as set out in the plot plan of the discharger, dated ____, 19__, and filed with the Ministry.

0100 = Clarifier Effluent to Lake

Process Effluent Limits and Monitoring Frequency

PLANT: **Geon Canada Inc. (Thorold)**

ATG	Parameter Column 1	Monitoring Frequency Column 2	Daily Plant Loading Limit kg/day Column 3	Monthly Average Plant Loading Limit kg/day Column 4
2	Cyanide Total	Q	0.40	-
4	Ammonia plus Ammonium	W	3.5	1.4
4	Total Kjeldahl nitrogen	D	10	3.9
5	DOC	D	71	21
6	Total phosphorus	W	0.98	0.37
8	Total suspended solids	D	120	36
9	Aluminum	Q	7.1	-
14	Phenolics (4AAP)	W	0.24	0.078
16	Vinyl chloride	W	0.18	0.068
25	Oil and grease	W	13	5.6
24	2,3,7,8-tetrachlorodibenzo-para-dioxin	Q		
	2,3,7,8-tetrachlorodibenzofuran	Q		
	TEQ	Q		

Explanatory Notes:

ATG	Analytical Test Group
TEQ	total toxic equivalent of 2,3,7,8 substituted dioxin and furan congeners
kg/day	kilograms per day
D	Daily monitoring requirement
W	Weekly monitoring requirement
Q	Quarterly monitoring requirement

Process Effluent Sampling Point Number, Name and Location as set out in the plot plan of the discharger, dated ____, 19__, and filed with the Ministry.

0100 = Final Effluent to River

Process Effluent Limits and Monitoring Frequency

PLANT: **Goodyear Canada Inc. (Bowmanville)**

ATG	Parameter	Monitoring Frequency	Daily Plant Loading Limit kg/day	Monthly Average Plant Loading Limit kg/day
	Column 1	Column 2	Column 3	Column 4
5	DOC	W	3.2	1.5
6	Total phosphorus	Q	0.21	-
8	Total suspended solids	D	3.8	1.1
9	Aluminum	Q	0.088	-
9	Zinc	Q	0.0012	-
14	Phenolics (4AAP)	W	0.0024	0.0010
15	Sulphide	W	0.14	0.043
25	Oil and grease	W	1.8	0.59

Explanatory Notes:

ATG	Analytical Test Group
TEQ	total toxic equivalent of 2,3,7,8 substituted dioxin and furan congeners
kg/day	kilograms per day
D	Daily monitoring requirement
W	Weekly monitoring requirement
Q	Quarterly monitoring requirement

Process Effluent Limits and Monitoring Frequency

PLANT: **Guardsman Products Ltd. (Cornwall)**

ATG	Parameter	Monitoring Frequency	Daily Plant Loading Limit	Monthly Average Plant Loading Limit
			kg/day	kg/day
	Column 1	Column 2	Column 3	Column 4
5	DOC	W	1.7	0.77
6	Total phosphorus	Q	0.042	-
8	Total suspended solids	W	2.1	1.0
17	Toluene	W	0.0019	0.00086
25	Oil and grease	W	0.42	0.21

Explanatory Notes:

ATG	Analytical Test Group
TEQ	total toxic equivalent of 2,3,7,8 substituted dioxin and furan congeners
kg/day	kilograms per day
D	Daily monitoring requirement
W	Weekly monitoring requirement
Q	Quarterly monitoring requirement

Process Effluent Sampling Point Number, Name and Location as set out in the plot plan of the discharger, dated ____, 19__, and filed with the Ministry.

0100 = Southeast Drain to River

Process Effluent Limits and Monitoring Frequency

PLANT: **Imperial Oil Chemicals Division (Sarnia)**

ATG	Parameter	Monitoring Frequency	Daily Plant Loading Limit kg/day	Monthly Average Plant Loading Limit kg/day
	Column 1	Column 2	Column 3	Column 4
5	DOC	D	410	270
6	Total phosphorus	Q	12	-
8	Total suspended solids	W	810	420
14	Phenolics (4AAP)	W	0.34	0.21
16	Vinyl chloride	D	8.9	2.2
17	Benzene	D	0.84	0.19
17	Toluene	Q	1.4	-
23	Hexachlorobutadiene	Q	0.0091	-
25	Oil and grease	W	150	72

Explanatory Notes:

ATG	Analytical Test Group
TEQ	total toxic equivalent of 2,3,7,8 substituted dioxin and furan congeners
kg/day	kilograms per day
D	Daily monitoring requirement
W	Weekly monitoring requirement
Q	Quarterly monitoring requirement

Process Effluent Sampling Point Number, Name and Location as set out in the plot plan of the discharger, dated ____, 19__, and filed with the Ministry.

0300 = Final Effluent to River

Process Effluent Limits and Monitoring Frequency

PLANT:	**Morbern Inc. (Cornwall)**			
ATG	Parameter	Monitoring Frequency	Daily Plant Loading Limit	Monthly Average Plant Loading Limit
			kg/day	kg/day
	Column 1	Column 2	Column 3	Column 4
5	DOC	W	5.9	4.2
6	Total phosphorus	Q	0.22	-
8	Total suspended solids	W	25	12
9	Aluminum	Q	0.34	-
9	Zinc	Q	0.22	-
14	Phenolics (4AAP)	W	0.023	0.0079
25	Oil and grease	W	4.9	2.5

Explanatory Notes:

ATG	Analytical Test Group
TEQ	total toxic equivalent of 2,3,7,8 substituted dioxin and furan congeners
kg/day	kilograms per day
D	Daily monitoring requirement
W	Weekly monitoring requirement
Q	Quarterly monitoring requirement

Process Effluent Sampling Point Number, Name and Location as set out in the plot plan of the discharger, dated ____, 19__, and filed with the Ministry.

0100 = East Cooling Water to River

Process Effluent Limits and Monitoring Frequency

PLANT: **Novacor Chemicals Ltd. (Mooretown)**

ATG	Parameter	Monitoring Frequency	Daily Plant Loading Limit kg/day	Monthly Average Plant Loading Limit kg/day
	Column 1	Column 2	Column 3	Column 4
5	DOC	W	19	11
6	Total phosphorus	W	1.9	1.1
8	Total suspended solids	D	98	34
9	Aluminum	Q	2.6	-
9	Zinc	Q	0.28	-
14	Phenolics (4AAP)	W	0.015	0.0070
25	Oil and grease	W	6.6	3.3

Explanatory Notes:

ATG	Analytical Test Group
TEQ	total toxic equivalent of 2,3,7,8 substituted dioxin and furan congeners
kg/day	kilograms per day
D	Daily monitoring requirement
W	Weekly monitoring requirement
Q	Quarterly monitoring requirement

Process Effluent Sampling Point Number, Name and Location as set out in the plot plan of the discharger, dated ____, 19__, and filed with the Ministry.

0100 = Final Effluent to River

Process Effluent Limits and Monitoring Frequency

PLANT:	Polysar Rubber Corporation (Sarnia)			
ATG	Parameter	Monitoring Frequency	Daily Plant Loading Limit kg/day	Monthly Average Plant Loading Limit kg/day
	Column 1	Column 2	Column 3	Column 4
4	Ammonia plus Ammonium	W	200	68
4	Nitrate + Nitrite	W	290	110
4	Total Kjeldahl nitrogen	D	210	51
5	DOC	D	880	330
6	Total phosphorus	W	51	19
8	Total suspended solids	D	1400	450
9	Aluminum	W	170	57
9	Cobalt	W	0.40	0.28
9	Zinc	W	15	4.9
14	Phenolics (4AAP)	W	0.66	0.27
16	Bromoform	W	1.2	0.37
16	Bromomethane	D	1.4	0.32
16	Chloroform	W	1.2	0.39
16	Chloromethane	D	2.1	0.60
16	Methylene chloride	Q	0.21	-
17	Benzene	W	0.39	0.14
25	Oil and grease	W	190	95

Explanatory Notes:

ATG	Analytical Test Group
TEQ	total toxic equivalent of 2,3,7,8 substituted dioxin and furan congeners
kg/day	kilograms per day
D	Daily monitoring requirement
W	Weekly monitoring requirement
Q	Quarterly monitoring requirement

Process Effluent Limits and Monitoring Frequency

PLANT: **Rohm and Haas Canada Inc. (Morrisburg)**

ATG	Parameter	Monitoring Frequency	Daily Plant Loading Limit kg/day	Monthly Average Plant Loading Limit kg/day
	Column 1	Column 2	Column 3	Column 4
5	DOC	D	16	5.0
6	Total Phosphorus	Q	0.65	-
8	Total suspended solids	D	14	6.5
14	Phenolics (4AAP)	W	0.0056	0.0026
17	Toluene	W	0.035	0.013
25	Oil and grease	W	4.8	2.1

Explanatory Notes:

ATG	Analytical Test Group
TEQ	total toxic equivalent of 2,3,7,8 substituted dioxin and furan congeners
kg/day	kilograms per day
D	Daily monitoring requirement
W	Weekly monitoring requirement
Q	Quarterly monitoring requirement

Process Effluent Sampling Point Number, Name and Location as set out in the plot plan of the discharger, dated ____, 19__, and filed with the Ministry.

0100 = Final Outfall to River

Process Effluent Limits and Monitoring Frequency

PLANT: **Stepan Canada Ltd. (Longford Mills)**

ATG	Parameter	Monitoring Frequency	Daily Plant Loading Limit	Monthly Average Plant Loading Limit
			kg/day	kg/day
	Column 1	Column 2	Column 3	Column 4
4	Ammonia plus Ammonium	W	1.2	0.42
4	Total Kjeldahl nitrogen	D	1.5	0.46
5	DOC	D	6.2	2.8
6	Total phosphorus	W	0.16	0.061
8	Total suspended solids	D	6.3	2.1
9	Aluminum	W	0.68	0.24
14	Phenolics (4AAP)	W	0.0073	0.0028
16	Carbon tetrachloride	Q	0.0020	-
16	Chloroform	Q	0.0054	-
25	Oil and grease	W	2.2	0.94
27	PCBT	Q	0.040	-

Explanatory Notes:

ATG	Analytical Test Group
TEQ	total toxic equivalent of 2,3,7,8 substituted dioxin and furan congeners
kg/day	kilograms per day
D	Daily monitoring requirement
W	Weekly monitoring requirement
Q	Quarterly monitoring requirement

Process Effluent Sampling Point Number, Name and Location as set out in the plot plan of the discharger, dated ____, 19__, and filed with the Ministry.

0200 = Clarifier Effluent

Schedule 3
Process Effluent Sampling for Plants with More Than One Process Effluent Sampling Point

PLANT: Dow Chemical Canada Inc. (Sarnia) - Vidal Street

ATG	Parameter	Sampling Points		
		1700	1900	2000
	Column 1	Column 2	Column 3	Column 4
4	Ammonia plus Ammonium	-	X	-
4	Nitrate + Nitrite	-	-	X
4	Total Kjeldahl nitrogen	-	X	-
5	DOC	X	X	X
6	Total phosphorus	X	X	X
8	Total suspended solids	X	X	X
9	Aluminum	X	X	X
14	Phenolics (4AAP)	X	X	X
16	1,2-Dichloroethane	X	-	-
16	1,2-Dichloropropane	-	X	-
16	Methylene chloride	X	-	-
16	Tetrachloroethylene	X	-	-
16	Trichloroethylene	X	-	-
16	Vinyl chloride	X	-	-
17	Ethylbenzene	-	X	-
19	Bis (2-chloroisopropyl)ether	-	X	-
23	1,2,4-Trichlorobenzene	X	-	-
23	1,2,4,5-Tetrachlorobenzene	-	X	-
23	2,4,5-Trichlorotoluene	X	-	-
23	Hexachlorobenzene	X	-	-
23	Hexachloroethane	X	-	-
25	Oil and Grease	X	X	X
24	2,3,7,8-tetrachlorodibenzo-para-dioxin	X	X	X
	2,3,7,8-tetrachlorodibenzofuran	X	X	X
	TEQ	X	X	X

Explanatory Notes:

ATG	Analytical Test Group
TEQ	total toxic equivalent of 2,3,7,8 substituted dioxin and furan congeners
X	means that the corresponding parameter in Column 1 is specified for the sampling point and is required to be monitored at the sampling point

Process Effluent Sampling Point Numbers, Names and Locations as set out in the plot plan of the discharger, dated ____, 19__, and filed with the Ministry:

1700 = Block 90 Feed (Building 35 and 39) flowing into 4th Street Outfall to St. Clair River
1900 = Biox Plant Effluent flowing into 4th Street Outfall to St. Clair River
2000 = Boiler Feedwater Effluent flowing into 4th Street Outfall to St. Clair River

Process Effluent Sampling for Plants with More Than One Process Effluent Sampling Point

PLANT: Dow Chemical Canada Inc. (Sarnia) - La Salle Road			
ATG	Parameter	Sampling Points	
		2200	2300
	Column 1	Column 2	Column 3
5	DOC	X	X
6	Total phosphorus	X	X
8	Total suspended solids	X	X
9	Aluminum	X	X
14	Phenolics (4AAP)	X	X
25	Oil and grease	X	X

Explanatory Notes:

ATG	Analytical Test Group
TEQ	total toxic equivalent of 2,3,7,8 substituted dioxin and furan congeners
X	means that the corresponding parameter in Column 1 is specified for the sampling point and is required to be monitored at the sampling point

Batch Effluent Sampling Point Numbers, Names and Locations as set out in the plot plan of the discharger, dated ____, 19__, and filed with the Ministry.

2200 = La Salle Road Site - West Pond to Talfourd Creek (Process Effluent Batch Sampling Point)

2300 = La Salle Road Site - East Pond to Talfourd Creek (Process Effluent Batch Sampling Point)

Process Effluent Sampling for Plants with More Than One Process Effluent Sampling Point

PLANT: Du Pont Canada Inc. (Maitland)

ATG	Parameter	Sampling Points	
		0300	0400
	Column 1	Column 2	Column 3
2	Cyanide Total	X	-
4	Ammonia plus Ammonium	X	-
4	Nitrate + Nitrite	X	-
4	Total Kjeldahl nitrogen	X	-
5	DOC	X	X
6	Total phosphorus	X	X
8	Total suspended solids	X	X
9	Chromium	X	-
9	Cobalt	X	-
9	Copper	X	-
9	Vanadium	X	-
10	Arsenic	-	X
14	Phenolics (4AAP)	X	X
16	Tetrachloroethylene	-	X
23	Hexachlorobenzene	-	X
25	Oil and grease	X	X
24	2,3,7,8-tetrachlorodibenzo-para-dioxin	X	-
	2,3,7,8-tetrachlorodibenzofuran	X	-
	TEQ	X	-

Explanatory Notes:

ATG	Analytical Test Group
TEQ	total toxic equivalent of 2,3,7,8 substituted dioxin and furan congeners
X	means that the corresponding parameter in Column 1 is specified for the sampling point and is required to be monitored at the sampling point

Process Effluent Sampling Point Numbers, Names and Locations as set out in the plot plan of the discharger, dated ____, 19__, and filed with the Ministry.

0300 = Wastewater Treatment Plant Effluent to Main Effluent Stream
0400 = CFH Effluent to Cribbed Ditch

Process Effluent Sampling for Plants with More Than One Process Effluent Sampling Point

PLANT: Ethyl Canada Inc. (Sarnia)

ATG	Parameter	Sampling Points	
		0200	0300
	Column 1	Column 2	Column 3
4	Nitrate + Nitrite	X	-
5	DOC	X	X
6	Total phosphorus	X	X
8	Total suspended solids	X	X
9	Aluminum	X	X
9	Boron	-	X
9	Chromium	X	-
9	Lead	X	X
9	Zinc	-	X
12	Mercury	X	X
13	Total Alkyl Lead	-	X
14	Phenolics (4AAP)	X	X
15	Sulphide	-	X
16	1,2-Dichloroethane	X	X
16	Ethylene dibromide	X	X
16	Methylene chloride	-	X
17	Toluene	X	X
19	1-Methylnaphthalene	-	X
19	2-Methylnaphthalene	-	X
19	Acenaphthene	-	X
19	Biphenyl	-	X
19	Fluorene	-	X
19	Indole	-	X
19	Naphthalene	-	X
19	Phenanthrene	-	X
25	Oil and grease	X	X

Explanatory Notes:

ATG	Analytical Test Group
TEQ	total toxic equivalent of 2,3,7,8 substituted dioxin and furan congeners
X	means that the corresponding parameter in Column 1 is specified for the sampling point and is required to be monitored at the sampling point

Process Effluent Sampling Point and Process Effluent Batch Sampling Point Numbers Names and Locations as set out in the plot plan of the discharger, dated ____, 19__, and filed with the Ministry.

0200 = Speciality Chemicals Effluent (Process Effluent Sampling Point)
0300 = TEL Unit Effluent (Process Effluent Batch Sampling Point)

Process Effluent Sampling for Plants with More Than One Process Effluent Sampling Point

PLANT: Goodyear Canada Inc. (Bowmanville)

ATG	Parameter	Sampling Points	
		0600	0800
	Column 1	Column 2	Column 3
5	DOC	X	X
6	Total phosphorus	X	X
8	Total suspended solids	X	X
9	Aluminum	X	X
9	Zinc	-	X
14	Phenolics (4AAP)	X	X
15	Sulphide	X	X
25	Oil and grease	X	X

Explanatory Notes:

ATG	Analytical Test Group
TEQ	total toxic equivalent of 2,3,7,8 substituted dioxin and furan congeners
X	means that the corresponding parameter in Column 1 is specified for the sampling point and is required to be monitored at the sampling point

Process Effluent Sampling Point Numbers, Names and Locations as set out in the plot plan of the discharger, dated ____, 19__, and filed with the Ministry.

0600 = Outfall (H) to Lake Ontario
0800 = Outfall (K) to Lake Ontario

Process Effluent Sampling for Plants with More Than One Process Effluent Sampling Point

PLANT: Polysar Rubber Corporation (Sarnia)					
ATG	Parameter	Sampling Points			
		0900	1300	1700	1800
	Column 1	Column 2	Column 3	Column 4	Column 5
4	Ammonia plus Ammonium	-	-	-	X
4	Nitrate + Nitrite	-	-	-	X
4	Total Kjeldahl nitrogen	-	-	X	X
5	DOC	X	X	X	X
6	Total phosphorus	X	X	X	X
8	Total suspended solids	X	X	X	X
9	Aluminum	X	X	X	X
9	Cobalt	-	-	-	X
9	Zinc	X	X	X	X
14	Phenolics (4AAP)	X	X	X	X
16	Bromoform	-	-	-	X
16	Bromomethane	X	-	-	-
16	Chloroform	X	-	-	X
16	Chloromethane	X	X	-	X
16	Methylene chloride	X	-	-	-
17	Benzene	X	-	-	X
25	Oil and Grease	X	X	X	X

Explanatory Notes:

ATG	Analytical Test Group
TEQ	total toxic equivalent of 2,3,7,8 substituted dioxin and furan congeners
X	means that the corresponding parameter in Column 1 is specified for the sampling point and is required to be monitored at the sampling point

Process Effluent Sampling Point Numbers, Names and Locations as set out in the plot plan of the discharger, dated ____, 19__, and filed with the Ministry.

0900 = Butyl II Effluent to 66 inch Sewer to River
1300 = Butyl Holdup Pond to River
1700 = Neutralization Sump to River
1800 = Biox Plant Effluent to River

Schedule 4

Combined Effluent and Cooling Water Assessment

PLANT: BASF Canada Inc. (Fibres) (Arnprior)

ATG	Parameter	Monitoring Frequency
	Column 1	Column 2
5	DOC	W
6	Total phosphorus	W
8	Total suspended solids	W
14	Phenolics (4AAP)	W

Cooling Water Effluent Sampling Point Number, Name and Location as set out in the plot plan of the discharger, dated ____, 19__, and filed with the Ministry.

0100 = Storm Discharge to River (Cooling Water)

PLANT: BASF Canada Inc. (Sarnia)

ATG	Parameter	Monitoring Frequency
	Column 1	Column 2
5	DOC	W
8	Total suspended solids	W
17	Styrene	W
18	Acrylonitrile	W
25	Oil and Grease	W

Cooling Water Effluent Sampling Point Numbers, Names and Locations as set out in the plot plan of the discharger, dated ____, 19__, and filed with the Ministry.

0100 = #2 Plant Storm Sewer to River (Cooling Water)
0200 = #1 Plant Cooling Water to River (Cooling Water)

Explanatory Notes:
ATG Analytical Test Group
W Weekly monitoring requirement

Combined Effluent and Cooling Water Assessment

PLANT:	**Celanese Canada Inc. (Millhaven)**	
ATG	Parameter	Monitoring Frequency
	Column 1	Column 2
5	DOC	W
8	Total suspended solids	W

Cooling Water Effluent Sampling Point and Combined Effluent Sampling Point Numbers, Names and Locations as set out in the plot plan of the discharger, dated ____, 19__, and filed with the Ministry.

0100 = Centre Outfall to Lake (Combined Effluent)
0200 = West Outfall to Lake (Cooling Water)

PLANT:	**Dow Chemical Canada Inc. (Sarnia)**	
ATG	Parameter	Monitoring Frequency
	Column 1	Column 2
5	DOC	W
8	Total suspended solids	W
14	Phenolics (4AAP)	W

Combined Effluent Sampling Point and Cooling Water Effluent Sampling Point Numbers, Names and Locations as set out in the plot plan of the discharger, dated ____, 19__, and filed with the Ministry.

0300 = 48 inch Outfall to River (Cooling Water)
0500 = 54 inch Sluice Outfall to River (Cooling Water)
0600 = 2nd Street Outfall to River (Cooling Water)
0700 = 3rd Street Outfall to River (Cooling Water)
0900 = 4th Street Outfall to River (Combined Effluent)
1000 = 5th Street Outfall to River (Cooling Water)

Explanatory Notes:

ATG	Analytical Test Group
W	Weekly monitoring requirement

Combined Effluent and Cooling Water Assessment

PLANT: **Du Pont Canada Inc. (Kingston)**

ATG	Parameter	Monitoring Frequency
	Column 1	Column 2
5	DOC	W
8	Total suspended solids	W
19	Diphenyl ether	W

Cooling Water Effluent Sampling Point and Combined Effluent Sampling Point Numbers, Names and Locations as set out in the plot plan of the discharger, dated ____, 19__, and filed with the Ministry.

0700 = Service Sewer to Lake (Cooling Water)
1100 = Catch Tank Effluent to Lake (Combined Effluent)

PLANT: **Du Pont Canada Inc. (Maitland)**

ATG	Parameter	Monitoring Frequency
	Column 1	Column 2
5	DOC	W
8	Total suspended solids	W
14	Phenolics (4AAP)	W
25	Oil and Grease	W

Combined Effluent Sampling Point Number, Name and Location as set out in the plot plan of the discharger, dated ____, 19__, and filed with the Ministry.

1100 = Site Effluent to River (Combined Effluent)

Explanatory Notes:

ATG	Analytical Test Group
W	Weekly monitoring requirement

Combined Effluent and Cooling Water Assessment

PLANT:	**Du Pont Canada Inc. (Whitby)**	
ATG	Parameter	Monitoring Frequency
	Column 1	Column 2
5	DOC	W
8	Total suspended solids	W

Cooling Water Effluent Sampling Point Number, Name and Location as set out in the plot plan of the discharger, dated ____, 19__, and filed with the Ministry.

0700 = Cooling Water Ditch at Pellet Pond (Combined Effluent)

PLANT:	**Ethyl Canada Inc. (Sarnia)**	
ATG	Parameter	Monitoring Frequency
	Column 1	Column 2
5	DOC	W
8	Total suspended solids	W
14	Phenolics (4AAP)	W
25	Oil and Grease	W

Combined Effluent Sampling Point Number, Name and Location as set out in the plot plan of the discharger, dated ____, 19__, and filed with the Ministry.

0100 = Final Effluent to River (Combined Effluent)

Explanatory Notes:

ATG	Analytical Test Group
W	Weekly monitoring requirement

Combined Effluent and Cooling Water Assessment

PLANT:	**G.E. Plastics Canada Ltd. (Cobourg)**	
ATG	Parameter	Monitoring Frequency
	Column 1	Column 2
5	DOC	W
8	Total suspended solids	W
14	Phenolics (4AAP)	W
25	Oil and Grease	W

Cooling Water Effluent Sampling Point Number, Name and Location as set out in the plot plan of the discharger, dated ____, 19__, and filed with the Ministry.

0400 = Cooling Water to Lake (Cooling Water)

PLANT:	**Goodyear Canada Inc. (Bowmanville)**	
ATG	Parameter	Monitoring Frequency
	Column 1	Column 2
5	DOC	W
8	Total suspended solids	W

Cooling Water Effluent Sampling Point Numbers, Names and Locations as set out in the plot plan of the discharger, dated ____, 19__, and filed with the Ministry.

0100 = Outfall C (Cooling Water)
0300 = Outfall E (Cooling Water)
0400 = Outfall F (Cooling Water)
0500 = Outfall G (Cooling Water)
0700 = Outfall I (Cooling Water)

Explanatory Notes:

ATG	Analytical Test Group
W	Weekly monitoring requirement

Combined Effluent and Cooling Water Assessment

PLANT:	**Polysar Rubber Corporation (Sarnia)**	
ATG	Parameter	Monitoring Frequency
	Column 1	Column 2
5	DOC	W
8	Total suspended solids	W

Combined Effluent Sampling Point and Cooling Water Effluent Sampling Point Numbers, Names and Locations as set out in the plot plan of the discharger, dated ____, 19__, and filed with the Ministry.

0200 = 72 inch Sewer to River (Cooling Water)
0400 = 66 inch Sewer to River (Combined Effluent)
0500 = 54 inch Sewer to River (Cooling Water)
1400 = Turbine Cooling Water to River (Cooling Water)
2100 = NBR Cooling Water to Cole Drain (Cooling Water)
2200 = BE-2 Cooling Water to Cole Drain (Cooling Water)

PLANT:	**Stepan Canada Ltd. (Longford Mills)**	
ATG	Parameter	Monitoring Frequency
	Column 1	Column 2
5	DOC	W
6	Total phosphorus	W
8	Total suspended solids	W

Cooling Water Effluent Sampling Point Number, Name and Location as set out in the plot plan of the discharger, dated ____, 19__, and filed with the Ministry.

0100 = Effluent to Lake (Cooling Water)

Explanatory Notes:

ATG	Analytical Test Group
W	Weekly monitoring requirement

Combined Effluent and Cooling Water Assessment

PLANT: Uniroyal Chemical Ltd. (Elmira)

ATG	Parameter	Monitoring Frequency
	Column 1	Column 2
5	DOC	W
8	Total suspended solids	W
14	Phenolics (4AAP)	W
25	Oil and Grease	W

Cooling Water Effluent Sampling Point Numbers, Names and Locations as set out in the plot plan of the discharger, dated ____, 19__, and filed with the Ministry.

0200 = Outfall #2 to Canagagigue Creek (Cooling Water)
0800 = Shirt Factory Creek from Site (Cooling Water)
1100 = Shirt Factory Creek upstream of Site (Cooling Water)

Explanatory Notes:

ATG	Analytical Test Group
W	Weekly monitoring requirement

Schedule 5
Designated Sampling Points* for Lethality Limits

Plant Name	Sampling Point - Number and Description
Amoco Canada Resources Ltd. (Sarnia)	0100 = API Separator Effluent to River (Process Effluent)
BASF Canada Inc. (Arnprior)	0100 = Storm Discharge to River (Cooling Water)
BASF Canada Inc. (Sarnia)	0100 = #2 Plant Storm Sewer to River (Cooling Water)
	0200 = #1 Plant Cooling Water to River (Cooling Water)
Celanese Canada Inc. (Millhaven)	0100 = Centre Outfall to Lake (Combined Effluent)
	0200 = West Outfall to Lake (Cooling Water)
Chinook Group Limited (Sombra)	0100 = Sump Effluent to River (Process Effluent)
Cornwall Chemicals Ltd. (Cornwall)	0100 = Manhole 26 to River (Process Effluent)
Dow Chemical Canada Inc. (Sarnia) - Vidal Street	0300 = 48 inch Outfall to River (Cooling Water)
	0500 = 54 inch Sluice Outfall to River (Cooling Water)
	0600 = 2nd Street Outfall to River (Cooling Water)
	0700 = 3rd Street Outfall to River (Cooling Water)
	0900 = 4th Street Outfall to River (Combined Effluent)
	1000 = 5th Street Outfall to River (Cooling Water)
Dow Chemical Canada Inc. (Sarnia) - Scott Road	2100 = Scott Road Treated Runoff to River (Process Effluent)
Dow Chemical Canada Inc. (Sarnia) - La Salle Road	2200 = La Salle Road Site - West Pond to Talfourd Creek (Process Effluent Batch)
	2300 = La Salle Road Site - East Pond to Talfourd Creek (Process Effluent Batch)
Du Pont Canada Inc. (Corunna)	0200 = Final Effluent to River (Process Effluent)
Du Pont Canada Inc. (Kingston)	0700 = Service Sewer to Lake (Cooling Water)
	1100 = Catch Tank Effluent to Lake (Combined Effluent)
Du Pont Canada Inc. (Maitland)	1100 = Site Effluent to River (Combined Effluent)
Du Pont Canada Inc. (Whitby)	0700 = Cooling Water Ditch at Pellet Pond (Combined Effluent)
Ethyl Canada Inc. (Sarnia)	0100 = Final Effluent to River (Combined Effluent)

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* The designated sampling points for lethality limits are identified as to number, name and location on the plot plan of the discharger referenced for each plant in Schedules 2 and 3 and filed with the Ministry.

Schedule 5
Designated Sampling Points* for Lethality Limits

Plant Name	Sampling Point - Number and Description
G.E. Plastics Canada Ltd. (Cobourg)	0100 = Clarifier Effluent to Lake (Process Effluent)
	0400 = Cooling Water to Lake (Cooling Water)
Geon Canada Inc. (Thorold)	0100 = Final Effluent to River (Process Effluent)
Goodyear Canada Inc. (Bowmanville)	0100 = Outfall C (Cooling Water)
	0300 = Outfall E (Cooling Water)
	0400 = Outfall F (Cooling Water)
	0500 = Outfall G (Cooling Water)
	0600 = Outfall (H) to Lake Ontario (Process Effluent)
	0800 = Outfall (K) to Lake Ontario (Process Effluent)
Guardsman Products Ltd. (Cornwall)	0100 = Southeast Drain to River (Process Effluent)
Imperial Oil Chemicals Division (Sarnia)	0300 = Final Effluent to River (Process Effluent)
Morbern Inc. (Cornwall)	0100 = East Cooling Water to River (Process Effluent)
Novacor Chemicals Ltd. (Mooretown)	0100 = Final Effluent to River (Process Effluent)
Polysar Rubber Corporation (Sarnia)	0200 = 72 inch Sewer to River (Cooling Water)
	0400 = 66 inch Sewer to River (Combined Effluent)
	0500 = 54 inch Sewer to River (Cooling Water)
	1400 = Turbine Cooling Water to River (Cooling Water)
	1700 = Neutralization Sump to River (Process Effluent)
	1800 = Biox Plant Effluent to River (Process Effluent)
	2100 = NBR Cooling Water to Cole Drain (Cooling Water)
	2200 = BE-2 Cooling Water to Cole Drain (Cooling Water)
Rohm and Haas Canada Inc. (Morrisburg)	0100 = Final Outfall to River (Process Effluent)
Stepan Canada Ltd. (Longford Mills)	0100 = Effluent to Lake (Cooling Water)
Uniroyal Chemical Ltd. (Elmira)	0200 = Outfall #2 to Canagagigue Creek (Cooling Water)
	0800 = Shirt Factory Creek from Site (Cooling Water)

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* The designated sampling points for lethality limits are identified as to number, name and location on the plot plan of the discharger referenced for each plant in Schedules 2 and 3 and filed with the Ministry.

Schedule 6
Designated Sampling Points* for Chronic Toxicity Assessment

Plant Name	Sampling Point - Number and Description
Amoco Canada Resources Ltd. (Sarnia)	0100 = API Separator Effluent to River (Process Effluent)
Celanese Canada Inc. (Millhaven)	0100 = Centre Outfall to Lake (Combined Effluent)
Chinook Group Limited (Sombra)	0100 = Sump Effluent to River (Process Effluent)
Cornwall Chemicals Ltd. (Cornwall)	0100 = Manhole 26 to River (Process Effluent)
Dow Chemical Canada Inc. (Sarnia) - Vidal Street	0900 = 4th Street Outfall to River (Combined Effluent)
Dow Chemical Canada Inc. (Sarnia) - Scott Road	2100 = Scott Road Treated Runoff to River (Process Effluent)
Dow Chemical Canada Inc. (Sarnia) - La Salle Road	2200 = La Salle Road Site - West Pond to Talfourd Creek (Process Effluent Batch)
	2300 = La Salle Road Site - East Pond to Talfourd Creek (Process Effluent Batch)
Du Pont Canada Inc. (Corunna)	0200 = Final Effluent to River (Process Effluent)
Du Pont Canada Inc. (Kingston)	1100 = Catch Tank Effluent to Lake (Combined Effluent)
Du Pont Canada Inc. (Maitland)	1100 = Site Effluent to River (Combined Effluent)
Du Pont Canada Inc. (Whitby)	0700 = Cooling Water Ditch at Pellet Pond (Combined Effluent)
Ethyl Canada Inc. (Sarnia)	0100 = Final Effluent to River (Combined Effluent)
G.E. Plastics Canada Ltd. (Cobourg)	0100 = Clarifier Effluent to Lake (Process Effluent)
Geon Canada Inc. (Thorold)	0100 = Final Effluent to River (Process Effluent)
Goodyear Canada Inc. (Bowmanville)	0600 = Outfall (H) to Lake Ontario (Process Effluent)
	0800 = Outfall (K) to Lake Ontario (Process Effluent)
Guardsman Products Ltd. (Cornwall)	0100 = Southeast Drain to River (Process Effluent)
Imperial Oil Chemicals Division (Sarnia)	0300 = Final Effluent to River (Process Effluent)
Morbern Inc. (Cornwall)	0100 = East Cooling Water to River (Process Effluent)
Novacor Chemicals Ltd. (Mooretown)	0100 = Final Effluent to River (Process Effluent)
Polysar Rubber Corporation (Sarnia)	0400 = 66 inch Sewer to River (Combined Effluent)
	1700 = Neutralization Sump to River (Process Effluent)
	1800 = Biox Plant Effluent to River (Process Effluent)
Rohm and Haas Canada Inc. (Morrisburg)	0100 = Final Outfall to River (Process Effluent)
Stepan Canada Ltd. (Longford Mills)	0100 = Effluent to Lake (Combined Effluent)

* The designated sampling points for chronic toxicity assessment are identified as to number, name and location on the plot plan of the discharger referenced for each plant in Schedules 2 and 3 and filed with the Ministry.

SCHEDULE 7
REFERENCE PRODUCTS

Plant Name	Products
Amoco Chemicals Ltd.	•Propane •Isobutane •n-Butane •Hydrocarbon Condensate
BASF Canada Inc. (Arnprior)	•Nylon 6 Carpet Fibre •Nylon 6 Resin
BASF Canada Inc. (Sarnia)	•Styrene-Butadiene Latex
Celanese Canada Inc.	•Polyester Staple Fibre
Chinook Group Limited	•Alkyl Amines •Dimethyl Formamide •Choline Chloride
Cornwall Chemicals Ltd.	•Carbon Disulphide •Carbon Tetracholoride
Dow Chemical Canada Inc. (Sarnia) - Vidal Street	•Ethylbenzene •Styrene •Polystyrene •Polyethylene •Acrylic Latex •Epoxy Resins •Propylene Oxide Derivatives
Du Pont Canada Inc. (Corunna)	•Polyethylene
Du Pont Canada Inc. (Kingston)	•Nylon 66 Yarn •Nylon 66 Resin
Du Pont Canada Inc. (Maitland)	•Adipic Acid •Hexamethylene Diamine •Hydrogen Peroxide •Fluorochemicals •Spandex Fibre •Engineering Resins
Du Pont Canada Inc.(Whitby)	•Polyethylene Film •Polyethylene Netting •Nylon Film
Ethyl Canada Inc.	•Tetraethyl Lead •Aluminum Alkyls •Diesel Ignition Improvers
G.E. Plastics Canada Ltd.	•Acrylonitrile-Butadiene-Styrene (ABS) •Polycarbonate •Polybutylene Terephthalate (PBT)

SCHEDULE 7 (CON'T)
REFERENCE PRODUCTS

Plant Name	Products
Geon Canada Inc.	•Polyvinyl Chloride (PVC) Resins
Goodyear Canada Inc.	•Rubber Belting
Guardsman Products Ltd.	•Stains •Sealers •Topcoats •Paper Coatings •Unsaturated Polyester Resins •Alkyd Resins
Imperial Oil Chemicals Division	•Polyvinyl Chloride (PVC) Resins •Polyethylene •Benzene •Toluene •Xylene •Gasoline Fractions •Solvents
Morbern Inc.	•Vinyl Coated Fabric
Novacor Chemicals Ltd.	•Polyethylene
Novacor Chemicals Ltd. Petrochemical Division	•Ethylbenzene •Styrene
OxyChem Durez Canada	•Phenol-Formaldehyde Resin
Polysar Rubber Corporation	•Butadiene Rubbers •Specialty Rubbers
Rohm and Haas Canada Inc. - Morrisburg	•Acrylic Sheet •Petroleum Additives
Rohm and Haas Canada Inc. - West Hill	•Acrylic, Styrene and Vinyl Emulsions •Soya Oil Plasticizer
Stepan Canada Ltd.	•Detergent Bases •Wetting Agents •Emulsifying Agents
Uniroyal Chemical Ltd.	•Rubber Accelerators •Antioxidants/Antiozonants •Seed Fungicide •Food Flavoring Agents •Synthetic Oils